BRITAIN and ATOMIC ENERGY 1939-1945

MARGARET GOWING

NOTES:

1. UK called bomb project "Tube Alloys" due to endorsing U235 enrichment by UF_6 gaseous diffusion method.

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2. In 1943, UK-USA collaboration broke down: USA rejected both

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the "cascade of cascades" enrichment method (they used only

With an introductory chapter by Kenneth Jay

a single cascade!), and USA also rejected the "rabbit principle".

3. U.K. supplied powdered nickel, from Mond Nickel Co., in Wales.

London, Macmillan & Co Ltd
New York, St Martin's Press

1964.

3000 tons of powdered nickel were shipped from UK to USA up to June 1945 for making UF_6 barrier membranes. (PAGE 256.

APPENDIX 1 The Frisch-Peierls Memorandum[1]

1940

On the Construction of a 'Super-bomb'; based on a Nuclear Chain Reaction in Uranium

The critical radius r_0 — i.e. the radius of a sphere in which the surplus of neutrons created by the fission is just equal to the loss of neutrons by escape through the surface — is, for a material with a given composition, in a fixed ratio to the mean free path of the neutrons, and this in turn is inversely proportional to the density. It therefore pays to bring the material into the densest possible form, i.e. the metallic state, probably sintered or hammered. If we assume, for ^{235}U, no appreciable scattering, and 2·3 neutrons emitted per fission, then the critical radius is found to be 0·8 times the mean free path. In the metallic state (density 15), and assuming a fission cross-section of 10^{-23} cm^2, the mean free path would be 2·6 cm and r_0 would be 2·1 cm, corresponding to a mass of 600 grams. A sphere of metallic ^{235}U of a radius greater than r_0 would be explosive, and one might think of about 1 kg as a suitable size for the bomb.

QUOTE

If the reaction proceeds until most of the uranium is used up, temperatures of the order of 10^{10} degrees and pressures of about 10^{13} atmospheres are produced. It is difficult to predict accurately the behaviour of matter under these extreme conditions, and the mathematical difficulties of the problem are considerable. By a rough calculation we get the following expression for the energy liberated before the mass expands so much that the reaction is interrupted:

$$E=0{\cdot}2M(r^2/\tau^2)(\sqrt{(r/r_0)}-1) \qquad (1)$$

(M, total mass of uranium; r, radius of sphere; r_0, critical radius; τ, time required for neutron density to multiply by a factor e). For a sphere of diameter 4·2 cm ($r=2{\cdot}1$ cm), $M=4700$ grams, $\tau=4\times10^{-9}$ sec, we find $E=4\times10^{22}$ ergs, which is about one-tenth of the total fission energy. For a radius of about 8 cm ($M=32$ kg) the whole fission energy is liberated, according to formula (1). For small radii the efficiency falls off even faster than indicated by formula (1) because τ goes up as r approaches r_0. The energy liberated by a 5 kg bomb would be equivalent to that of several thousand tons of dynamite, while that of a 1 kg bomb, though about 500 times less, would still be formidable.

The fission of uranium results in the formation of a great number of active bodies with periods between, roughly speaking, a second and a year. The resulting radiation is found to decay in such a way that the intensity is about inversely proportional to the time. Even one day after the explosion the radiation will correspond to a power expenditure of the order of 1000 kW, or to the radiation of a hundred tons of radium.

UK, NATIONAL ARCHIVES: CAB104/227.

APPENDIX 2 The Maud Reports

NOTE: UK, PRIVATE SECRETARY TO LORD HANKEY, JOHN CAIRNCROSS GAVE THIS SECRET REPORT TO MR

Report by M.A.U.D. Committee on the Use of Uranium for a Bomb JULY 1941

STALIN VIA NKVD SPY ANTOLY GORSKY (ALIAS USSR EMBASSY ATTACHÉ, ANATOLY GROMOV)!

PART I

1941

1. *General Statement*

if the war should end before the bombs are ready the effort would not be wasted, except in the unlikely event of complete disarmament, since no nation would care to risk being caught without a weapon of such decisive possibilities.

We know that Germany has taken a great deal of trouble to secure supplies of the substance known as heavy water. In the earlier stages

The best estimate of the kind of damage likely to be produced by the explosion of 1,800 tons of T.N.T. is afforded by the great explosion at Halifax N.S. in 1917. The following account is from the *History of Explosives*.[1] 'The ship contained 450,000 lb of T.N.T., 122,960 lb of guncotton, and 4,661,794 lb of picric acid wet and dry, making a total of 5,234,754 lb. The zone of the explosion extended for about $\frac{3}{4}$ mile in every direction and in this zone the destruction was almost complete. Severe structural damage extended generally for a radius of $1\frac{1}{8}$ to $1\frac{1}{4}$ miles, and in one direction up to $1\frac{3}{4}$ miles from the origin. Missiles were projected to 3–4 miles, window glass broken up to 10 miles generally, and in one instance up to 61 miles.'

In considering this description it is to be remembered that part of the explosives cargo was situated below water level and part above.

of material. Calculations of the efficiency have been made by Professor Peierls and in more detail by Dr M. H. L. Pryce. The results show that efficiencies of from 1 to 10% may be obtained, depending upon the ratio of the mass to that of the smallest amount of uranium in which a divergent chain reaction is possible and on certain other factors. It should be remembered that a uranium bomb with an efficiency of 1% would release as much energy as 180,000 times the weight of T.N.T.

MAUD report states Liverpool expt. gave 1.5 barns fission XS for U235 by 0.8 per neutrons

Appendix 2

Critical Mass in Kilos

Assumptions		Tamping	Cross-[section] $1 \cdot 5 \times 10^{-24}$
3 Neutrons per fission: (Plutonium 239)			
Cross-section for collision	4×10^{-24}	Untamped	17·2
Allowance for diffraction	1×10^{-24}	Fully[1] tamped	5·16
2·5 Neutrons per fission: (U-235);			
Cross-section for collision	$3 \cdot 5 \times 10^{-24}$	Untamped	42·7
Diffraction ignored		Fully[1] tamped	13·2

[1] A shell of material of a thickness two or three times the ra[dius] would give a result approximating to the fully ta[mped]

8. *Estimate of damage*

The 10 kg bomb we are supposing could readily be given an efficiency of 2% and the resulting release of energy will be equivalent to that of 3,600 tons T.N.T.

In considering such a proposal it is first necessary to be sure that the release of very large quantities of energy from a small mass will in fact do the damage that might be expected from experience with ordinary explosives. In the absence of such a bomb this can only be dealt with by calculation. Professor G. I. Taylor has examined this point for us and reports, 'the wave at big distances is quite comparable in pressure and in duration with that produced by the amount of T.N.T. which releases the same energy as your U bomb'. The exact ratio depends on detailed assumptions but it is not far from one-half, i.e. twice the energy release is needed from the U bomb to give the effect of T.N.T. Thus the damage done by a 10 kg bomb will be equal to that of 1,800 tons of T.N.T. Professor Taylor[1] has calculated the pressures at various distances due to the U bomb but as they last for much longer than those for experimental quantities of T.N.T., and so will probably do more damage, it is probably best to use as a standard the known effect of large accidental explosions such as that at Halifax in 1917. (Part I of this report.)

Besides the effects of the explosion, there will be very large amounts of radioactive material produced which will be scattered over the area affected by the explosion. It is in fact known that the products of the fissions are β active, passing through a number of transformations before becoming inert. It is very difficult to estimate the extent of their effect especially as the most important substances would be those of long life, which are the hardest to study under laboratory conditions. It does however seem certain that the area devastated by the explosion would be dangerous to life for a considerable time. The physiological effects of these radiations are delayed and cumulative so that great care would have to be taken in working anywhere near. If this were realised, the danger to life from this cause would probably be small compared with that due to the actual explosion.

9. *Problems of Development*

The main problem is the production of relatively very large quantities of separated isotopes. Secondary ones are the arrangements for producing the explosion when and where required.

[1] Appendix V.

(2) The use of nuclear energy to provide an explosive involves the following processes:

(*a*) Production of UF_6.

(*b*) Separation of the reactive isotope.

(*c*) Production of massive uranium metal (235) from $^{235}UF_6$.

The production of 1 kg per day of ^{235}U involves the manufacture of 450–650 kg/day of UF_6, and it is considered that this quantity of UF_6 can be made on a commercial scale. The process which is recommended is the one which has been used for the preparation of 3 kilos of UF_6 for M.A.P. and involves the direct reaction between fluorine and metallic uranium. A plant to manufacture 450 kilos per day of UF_6 would cost approximately £100,000. The whole plant could be completed in approximately eighteen months if certain investigations are started at once.

The separation of the reactive isotope in a diffusion plant of the type suggested by Professor Simon appears to us to be practicable on the scale up to 1 kg ^{235}U per day. The total capital expenditure for a plant of this size is estimated to be about £5,000,000.

If every possible effort is made we believe that a separation unit could be ready for testing by March 1st, 1942, and the detailed design of the actual units for the plant should then be ready between June and September 1942. During this time plans could be prepared for the full-scale plant and preliminary work could be started on the site.

After August 1st, 1942, we consider that manufacture of separation units could start and in six months (i.e. by February 1st, 1943) a steady output of these units would be going to the factory site. These would be installed and production of $^{235}UF_6$ could be started in the autumn of 1943 and the first bomb would be produced by the end of 1943. Within a year the plant would be producing 30 kg per month (1 kg (^{235}U) per day), if this output were required.

This estimate is not based upon any firm figures for speed of production given by Messrs Metropolitan-Vickers, but it is given after a thorough discussion with Dr Guy on the assumption that the highest priority is given to the production of the units in the engineering shops where they would be made.

The $^{235}UF_6$ separated in such a plant can be converted to metallic uranium (235).

(3) The essential raw material for the process is uranium, of which the known supplies are very limited geographically. The two most important sources of the ore are in the Belgian Congo and Canada.

The ore is now mined for its radium content and the output of uranium before the war was approximately 300 tons/year.

There is a stock in Canada of probably 500 tons of uranium. In this country there is sufficient for research and development of the process of making metallic uranium.

For the manufacture of UF_6 we recommend that the metallic uranium should be made by reducing the oxide with calcium hydride. The fluorine could be recovered from treated UF_6 and used again to react with more uranium.

(4) The diffusion process for the separation of the reactive isotope has now reached a stage of development at which we recommend that a production committee should take charge of the problem. This committee would see that all the problems to be solved for the construction of a full-scale plant were investigated so that the results would be ready as they were required. It would also examine and report on the cost of smaller plants if, for technical or other reasons, it was considered desirable to produce less than 1 kilo per day. The committee would recommend a suitable site for the plant.

I.C.I. is prepared to take executive charge of this work on behalf of the M.A.P. The arrangement would be similar to that already made in other cases with this Ministry.

Cost of Uranium Bombs

Capital cost of the Isotope Separation Plant to make 360 kilos per year	£5,000,000
Working cost for 1 year	£1,500,000
Cost of uranium and other materials	£2,000,000
Cost of case and charging 36 bombs at £300	£10,000
	£8,510,000

If the total cost is charged to the 36 bombs cost per bomb is	each	£236,000

(One bomb is equivalent to 1,800 tons T.N.T.)

Cost of T.N.T. Bomb

Capital cost of T.N.T. plant to make 65,000 tons per year	£5,050,000
Cost of manufacture at £90 per ton	£5,850,000
Cost of case and charging of 65,000 bombs each containing 1 ton T.N.T. at £50 per bomb	£3,250,000
	£14,150,000

If the total cost is charged to the 65,000 bombs the cost per bomb is each	£218
and the total cost of 1,800 tons T.N.T. in bombs would be	£392,000

APPENDIX II TO M.A.U.D. REPORT

Extract from letter from Dr R. Ferguson, Research Department, Woolwich

If the weights of the two approaching bodies are of the order of 10 kg each, no especial difficulty is foreseen in imparting to each of these bodies a velocity of the order of 3,000 ft/sec. The major difficulty which at present I foresee would be to ensure that under the conditions of set-back and set-forward the condition of the material packed in the moving bodies remained satisfactory. This could, I think, be determined only by actual trial.

Provided that the weight of the two bodies to be projected is, as I have indicated above, to be of the order of 10 kg, the time required to work out the method by means of which a velocity of 3,000 ft/sec could be imparted to each of them simultaneously would be approximately 1–2 months, if the work were put on high priority and if the necessary staff were available.

July 1941

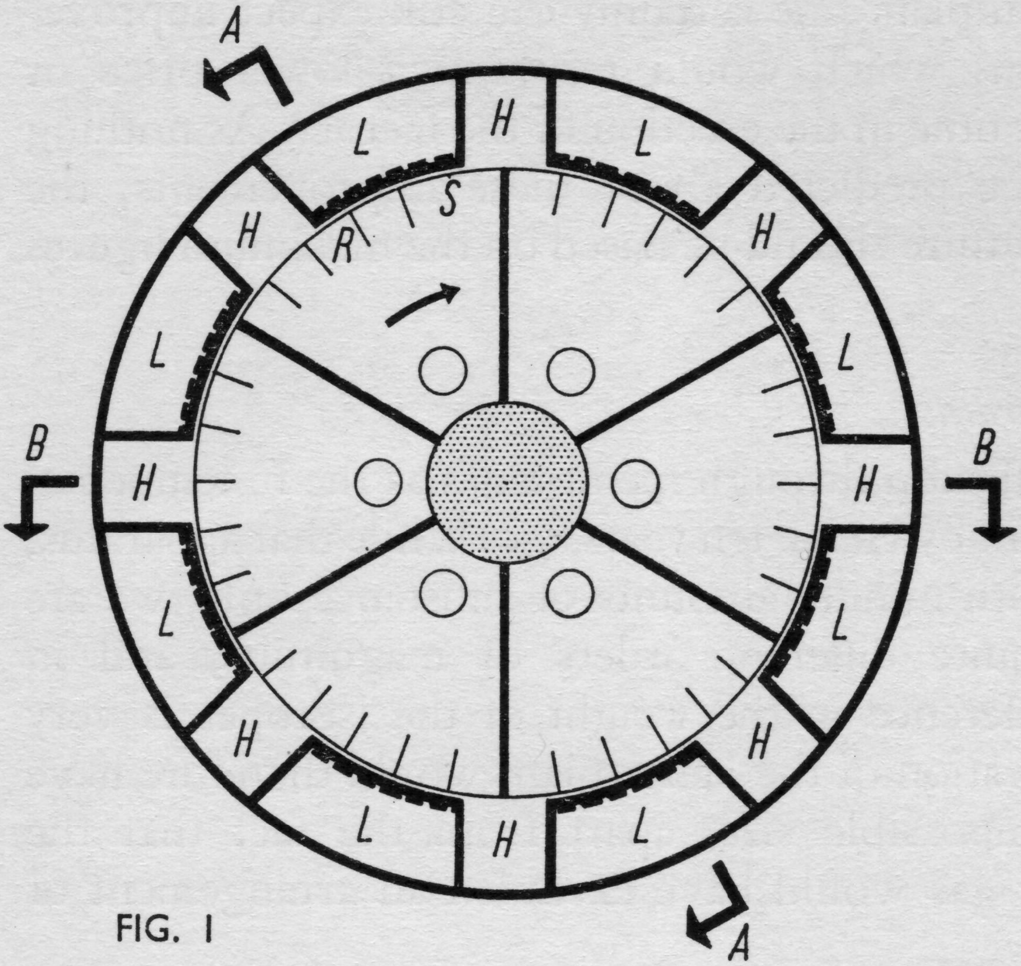
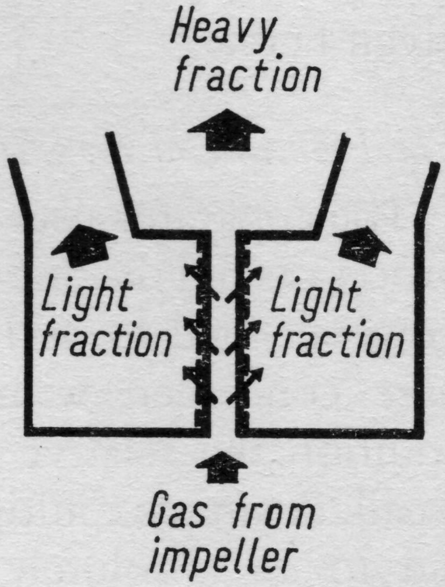


FIG. 1

FIG. 3



— Key —
------ Membranes

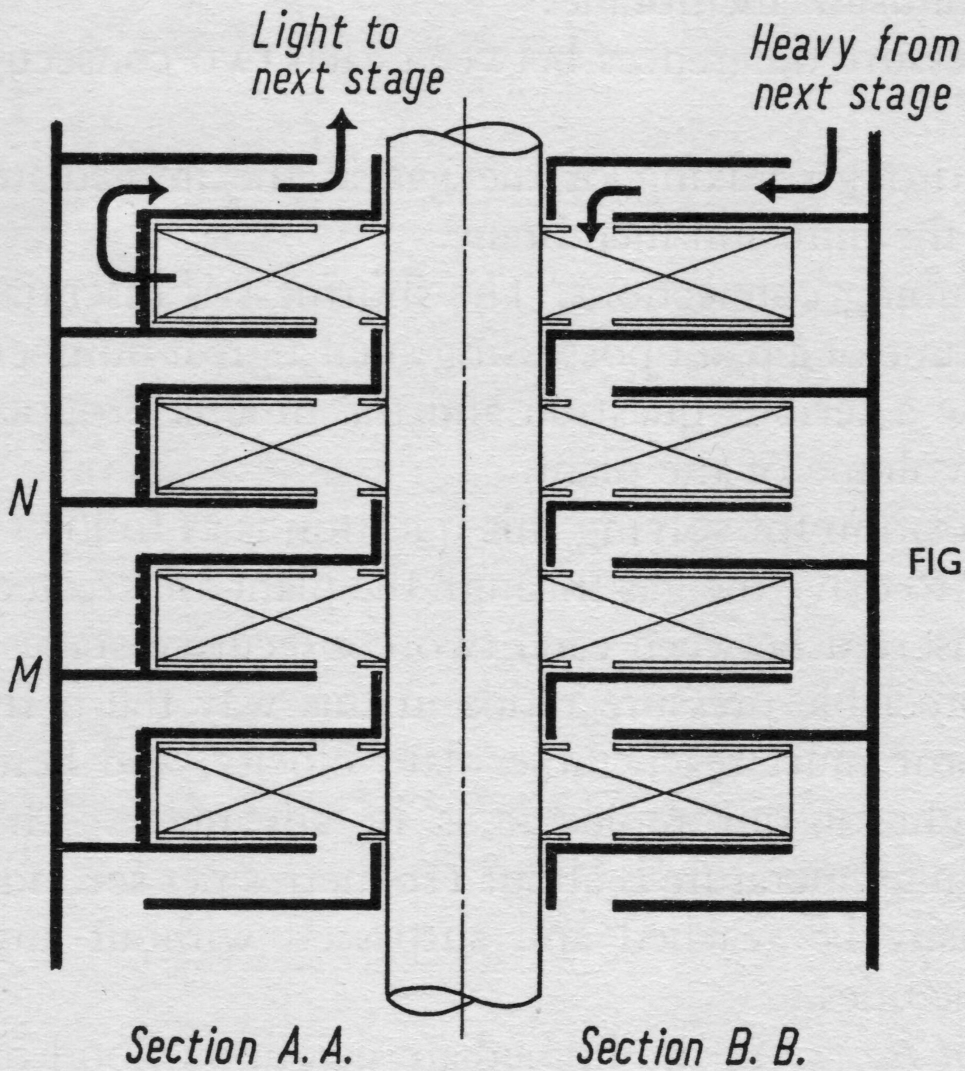


FIG. 2

membrane is fixed near its periphery. The gas enters somewhere near the axis and is pressed through the membrane, while at the same time the gas in the immediate neighbourhood of it is stirred thoroughly. The light isotope diffuses preferentially through the membrane while at the other side of the membrane a fraction richer in the heavy isotope gradually accumulates, progressing from *R* to *S*. This part, which is almost equal to that passing through the membrane, is ejected through the opening *H* after which the cycle begins anew. The length of the section of the membrane and, what is equivalent, the number of membranes at any one cross section, depends on the properties of the membrane and the velocity of the blades.

In Figure 2 a sketch of an assembly of a few stages is given as a cross section. The left-hand side of the figure shows a cross section through the diffusing membrane while on the right-hand side the plane of the drawing crosses one of the channels through which the heavy fraction is removed. The light fractions are passed on to the next stage in a way easily to be understood from the figure, while the heavy fractions are handed back to the previous stage. It can be seen that by repeating the parts between *N* and *M* the whole plant could be built up quite simply without complicated tube connections and so on.

(B) Peierls has proposed recently another solution for the question of mixing the gas which dispenses with the mechanical stirring. The idea is to force the gas through a narrow space (Figure 3) of which two membranes form the walls. Some of the gas diffuses through these membranes and this leaves the gas near the walls poor in light isotope. If the distance of the two walls from each other is kept sufficiently small this loss of light component will, by diffusion, be spread uniformly over the whole width. The gas therefore travels along the membrane pair with uniform but steadily decreasing content of light isotope. At the end of the pair just half the amount put in remains and this residue forms the heavy portion. The gas which has diffused through the membrane into the space outside the membrane pair forms the light fraction. The dimensions of the pair depend on the characteristics of the membrane (hole size and permeability) and it should be mentioned that with the membranes at present at our disposal the dimensions remain within reasonable limits; for instance, the distance between the two membranes is of the order of $\frac{1}{2}$ to 1 mm.

The gas can be supplied to such an arrangement by any means as the blades do not serve the double purpose as in (A) and therefore one can consider employing quite different types of compressors. One can show,

available which can be used for sealing purposes. No entirely satisfactory liquid, however, has yet been found, either for lubricating purposes or for use in a centrifugal seal. It seems, therefore, certain that the bearings have to run in an atmosphere free from our gas and thus the provision of glands is essential. We have given much attention, together with Metropolitan-Vickers, to this point, and we are convinced that a labyrinth gland of conventional construction together with the use of a buffer gas, which at intervals is removed from our gas, will give a satisfactory solution.

Experiments with models of different sizes have shown that peripheral speeds of the rotor even twice as high as the velocity of sound do not give rise to appreciable heat of friction in the gas at our working pressures, which are of the order of 1 to 2 mm. One therefore can create pressure ratios of 4 or 5 to 1 without encountering any difficulties in removing the heat of friction and a very compact machine is possible.

A great number of experiments have been carried out for the production of suitable membranes by rolling wire gauzes. The best results obtained so far have been achieved with 450 mesh gauze which allowed the production of holes of a diameter of 10^{-4} cm and a permeability of the membrane of 3%. Experiments in Professor Thomson's Laboratory have given a value of the viscosity and therefore of the mean free path, and one can deduce from these results that at a pressure of 2 mm mercury the mean free path will be equal to this hole size and thus result in satisfactory separation.

Experiments were carried out on the actual separation of two gases of about the same molecular weight as our gas but with a much bigger difference so that even a single stage can give separations which can be measured. Experiments with arrangement (A) have not yet given final results owing to difficulties of a secondary nature. Experiments with a membrane pair, however, have been carried out successfully and the separations attained show an effect of the right order. More accurate data as well as data on (A) can be expected within a short time.

In conclusion we can state, and this is also the opinion of Metropolitan-Vickers, that there do not seem to exist any indications that a plant of this type cannot be built, although much attention has, of course, still to be given to details.

The Size of the Plant

In order to keep the size and consequently the price down one has to make the maximum use of the output of each impeller. Under our

size of the plant between the input stage and the output of the light fraction. The size of the part between input and output of the heavy fraction depends on the concentration of the reject which we choose. The choice is determined by the relative costs of the separation plant and the plant for the production of the substance. As the former influence is by far the prevailing one it pays to reject at a relatively high concentration. We choose for this a concentration of 0·45% (the original product enters with 0·7%). This means that we have to feed to the plant, for an output of 1 kilo of metal, 0·63 tons of the compound and calculation shows that now the size of the second part of the plant is 10% of that of the first one. The total amount circulating will therefore be $1{\cdot}43 \times 10^6$ *g/sec.*

A 10-stage rotor of 72 cm diameter and 9 cm blade width has been chosen by Metropolitan-Vickers as the most convenient size for technical and production reasons. Such a rotor has a total surface at the periphery of 2 M^2 and therefore a total output of $2M^2 \times 10$ M/sec= $20M^3$/sec. Our gas has a density of 37·5 g/M^3 at a working pressure of 2 mm and 25°C. Therefore 1,900 of these units are necessary to handle the total amount.

The total area of a membrane manufactured from about 200 mesh gauze would under our conditions be about 100,000 M^2 or roughly 60 M^2 per machine. These could be accommodated in 5 concentric layers of membrane-pairs, thus adding 15 to 20 cm to the radius. The width of each pair would be 1 mm, the length 20 mm.

In the opinion of I.C.I. a convenient *size of building* for housing these machines would be 320 ft × 80 ft containing 400 machines so that five of these buildings would be required. These together with the auxiliary and preparation plants could easily be accommodated on a site of about 20 acres.

As regards the *power consumption* no exact figure can be given, at present, of the power required for each machine but it seems very improbable that this will exceed 10–15 kW. Allowing a margin on this and adding the power for auxiliary machinery we may assume that 20 kW per machine or 40,000 kW for the whole plant will cover the power requirements.

The Price of the Plant

Metropolitan-Vickers have gone into the question of the cost of a unit of the size mentioned and they estimate that in mass production each machine would cost between £1,500 and £2,000 (say £1,750).

(1) The electro-deposited material 'Lectromesh' might be produced at very fine mesh.

(2) The 'Lectromesh' procedure might be utilised to produce slit type membranes which would increase the permeability (given the same working pressure). We have enquired of the makers of 'Lectromesh' about these two possibilities.

(3) I.C.I. are conducting experiments for producing slit-type membranes by winding thin wire round a former.

(4) According to a suggestion of Professor Lindemann's an attempt can be made to produce very small holes in thin foils by bombarding them with colloidal particles in a vacuum. Various other suggestions for perforating thin foil are also under consideration.

If any of these suggested improvements should prove successful it will affect only the *number* of machines required and not the design of each machine, so the construction of the 20-stage model will be put in hand as soon as possible. It is proposed to build this 20-stage model in two units of 10 stages each, one working according to arrangement (A), the other with arrangement (B).

APPENDIX V TO M.A.U.D. REPORT

The blast to be expected from a Uranium Bomb
by Professor G. I. Taylor, M.A., D.Sc., D.C.L., F.R.S.

If every atom in 10 kg of uranium in a uranium bomb could yield its energy the amount liberated has been calculated to be 7×10^{21} ergs. On the other hand it is not to be expected that more than a fraction ϵ, which may be of order 1/100th, of this energy would be liberated. Setting therefore $7\times10^{21}\times\epsilon$ for E in eq. 35, the maximum pressure to be expected at distance R from the explosion is given by

$$p_{\max}=0{\cdot}155\times7\times10^{21}\epsilon R^{-3} \tag{A}$$

and the pressure in the central region is

$$p=0{\cdot}133\times0{\cdot}436\times7\times10^{21}\epsilon R^{-3}$$
$$=4{\cdot}0\times10^{20}\epsilon R^{-3}. \tag{B}$$

By the time the central region has reached atmospheric pressure (10^6dynes/sq cm) the maximum pressure is still

$$\frac{0{\cdot}155}{0{\cdot}133\times0{\cdot}436}=2{\cdot}67 \text{ atmospheres,}$$

so that there is still more than $1\frac{1}{2}$ atmospheres or 21 lb/sq inch excess pressure in the blast wave. The radius of the blast wave at this time is found by setting $p=10^6$ in (B). Thus $R^3=4\times10^{14}\epsilon$. Taking $\epsilon=\frac{1}{100}$, $R=(4\times10^{12})^{\frac{1}{3}}$ cm$=160$ m. At 160 m therefore the blast pressure is about 21 lb/sq in.

When the excess pressure is reduced below about 10 lb/sq. in. the decrease with distance is considerably less rapid than the inverse cube law. With a series of high explosive charges of various weights ranging from $2\frac{3}{4}$ to 76 lb the excess pressure was found to decrease from 21 lb/sq. in. to 5 lb/sq. in. when the distance from the centre was doubled (this corresponds roughly with the inverse square law in this part of the range). Thus it might be expected that the pressure in the blast wave from the uranium bomb would fall to 5 lb/sq. in. at $2\times160=320$ m from the explosion.

The duration of the positive pressure might be expected to be much greater than that of any existing bomb. If a charge of T.N.T. were large enough to give a pressure of 5 lb/sq. in. at 320 m its diameter would be 1/60th of $320=5{\cdot}3$ m$=17{\cdot}5$ ft. The duration of the blast at 60 charge diameters from the explosive is about $12\times10^{-3}\times$(charge diameter in feet)$=210$ m/sec. It seems likely that only exceptionally strong structures would survive the application of 5 lb/sq. in. for 210 m/sec. Light structure would be destroyed to a much greater distance than 320 m.

The theoretical calculation of the proportion of the total energy released from a uranium bomb which is ineffective in doing external work, and also the comparison between the measured pressure near masses of T.N.T. and C.E. with those calculated for an infinitely concentrated source emitting the same total energy, both lead to the conclusion that the blast wave from a uranium bomb would be similar to that from the mass of high explosive which releases about half as much energy. If 10 kg of uranium releases 1/100th of the maximum possible energy 7×10^{19} ergs would be released. One gramme of T.N.T. releases about 950 calories or $4{\cdot}0\times10^{10}$ ergs so that the weight of T.N.T. which might be expected to produce blast effects equivalent to those of the uranium explosion is $\frac{1}{2}\times\frac{7\times10^{19}}{4\times10^{10}}$ grammes$=900$ tons.

12th June 1941


K 22
K. E. J. Fuchs

Dr Nunn May, SPY

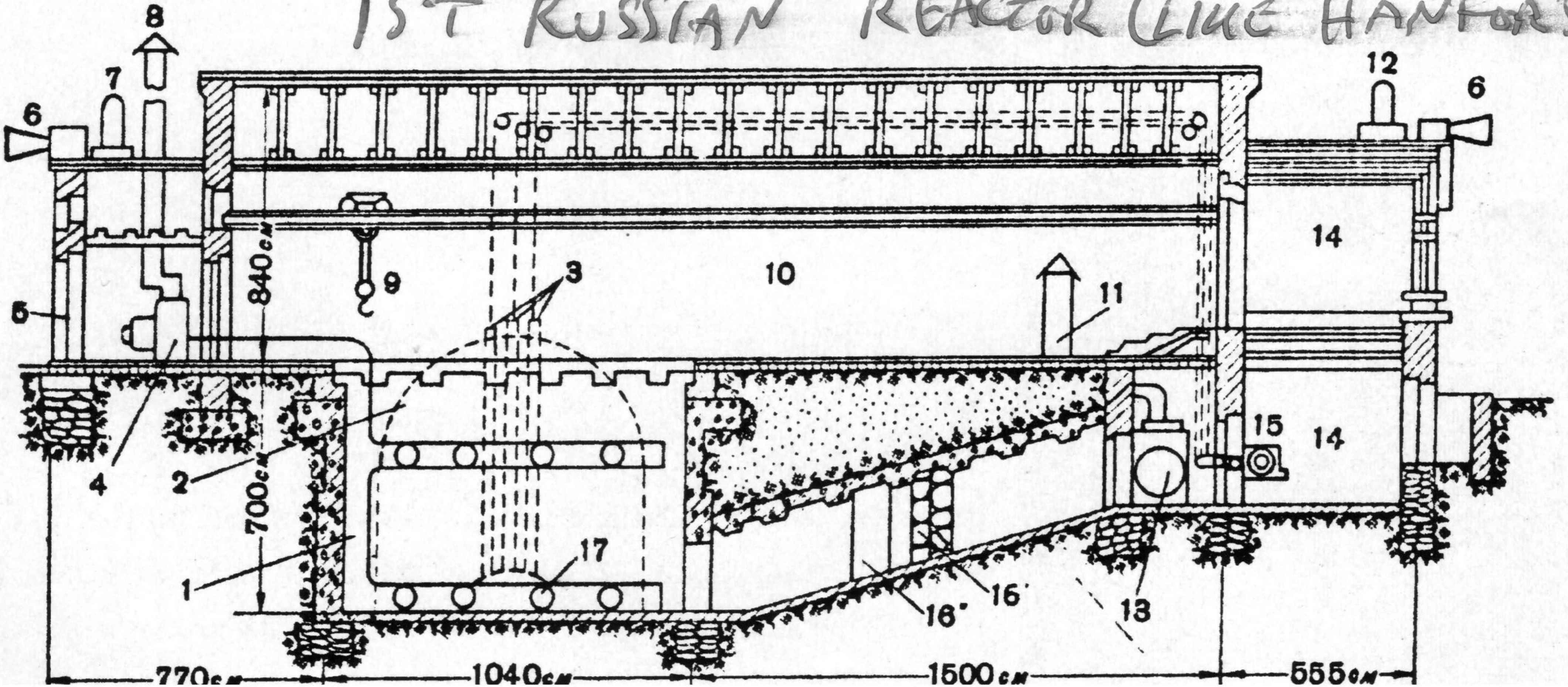
FEYNMAN BREAKING INTO LOS ALAMOS SAFE – NO REAL SECURITY!!

At Los Alamos: "*I opened the safes which contained behind them the entire secret of the atomic bomb ...*"

LOS ALAMOS

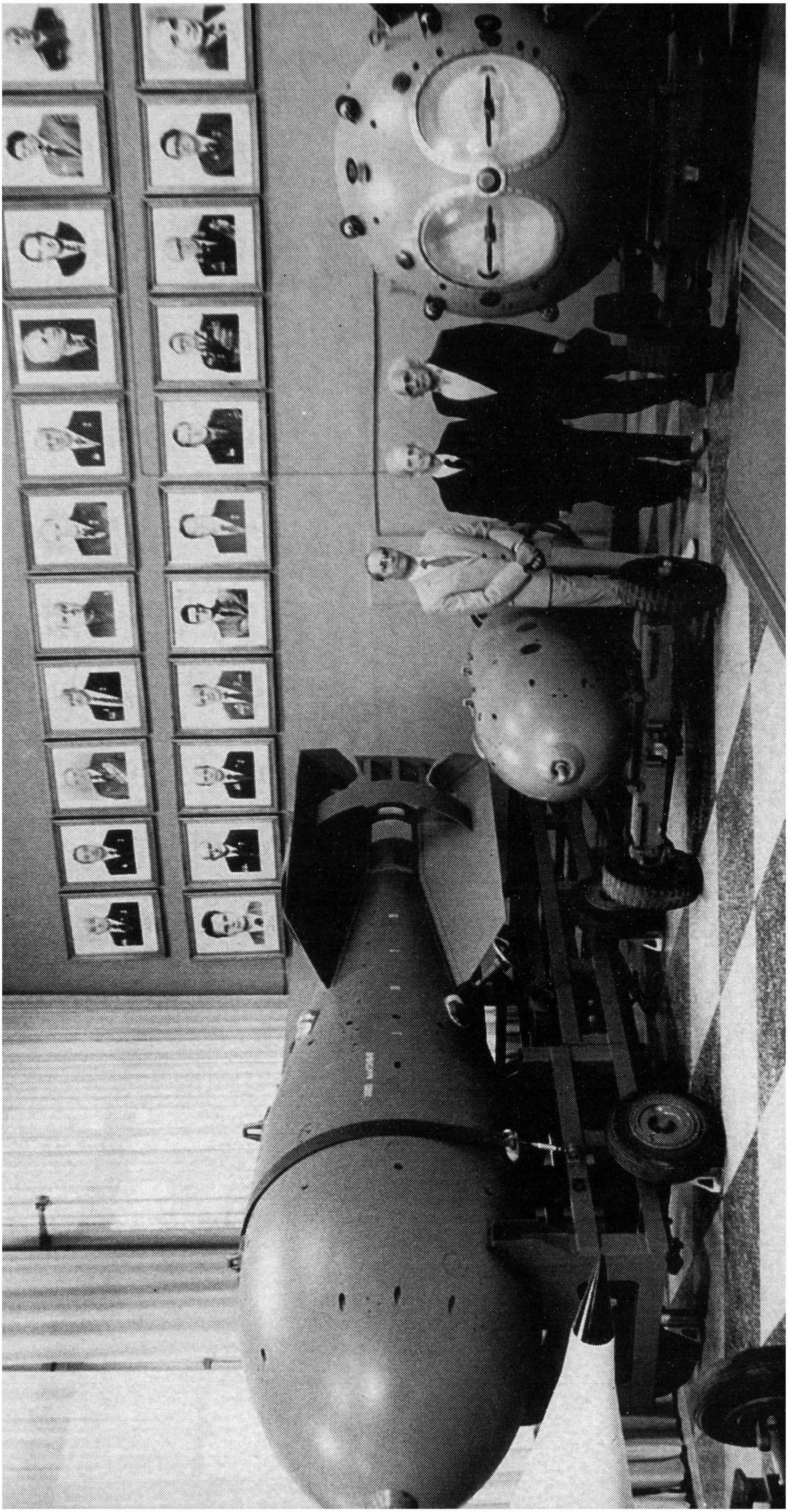
OPPENHEIMER FEYNMAN

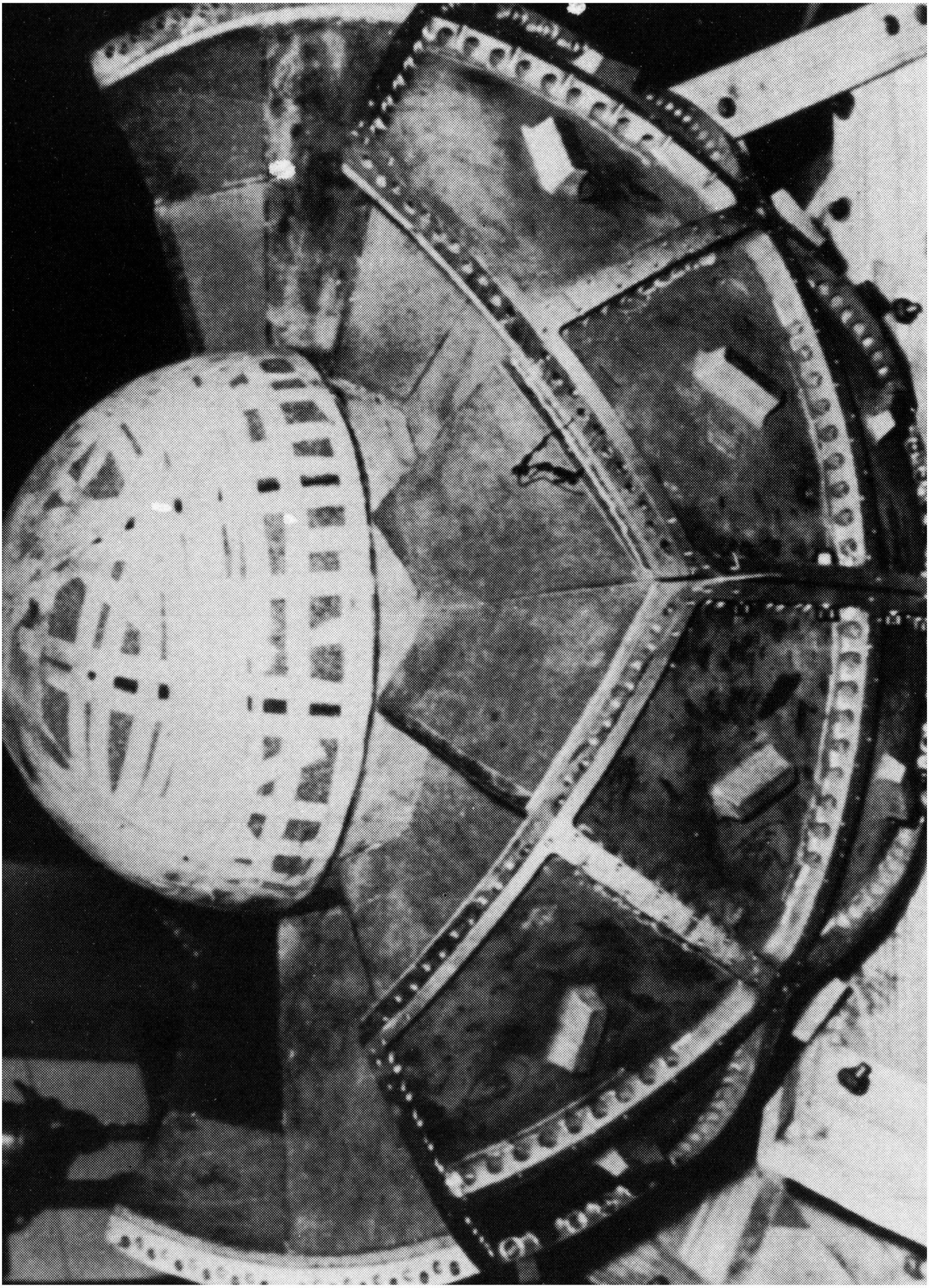
1ST RUSSIAN REACTOR (LIKE HANFORD

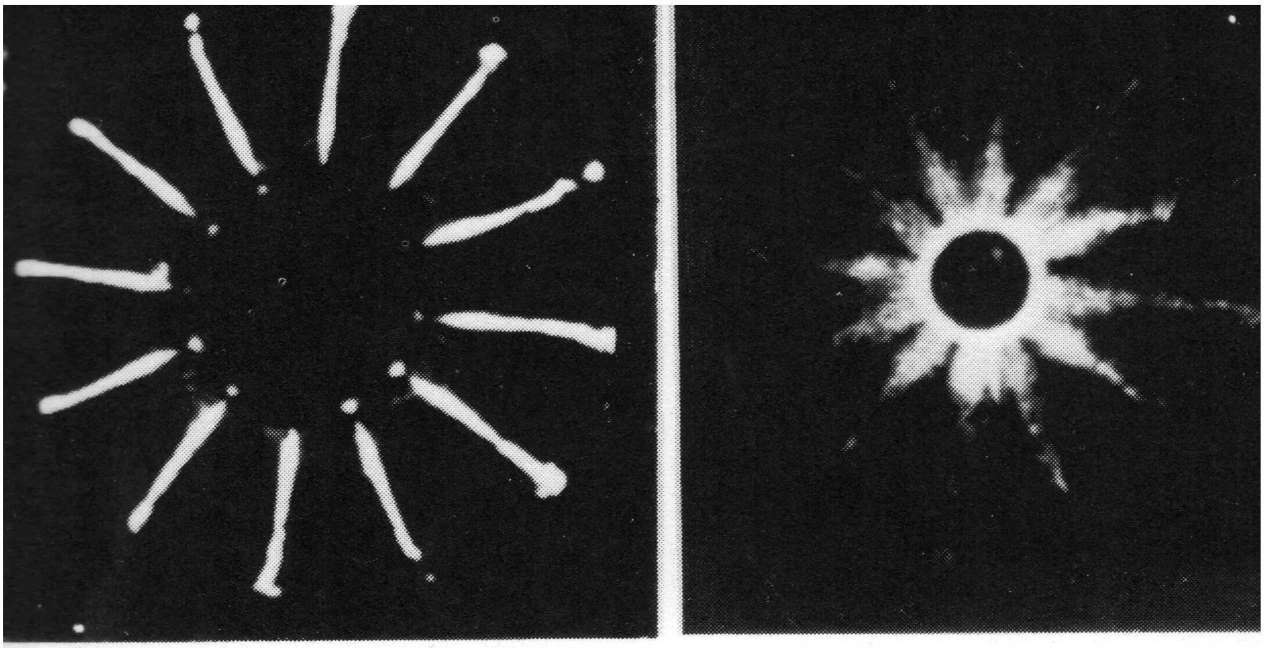


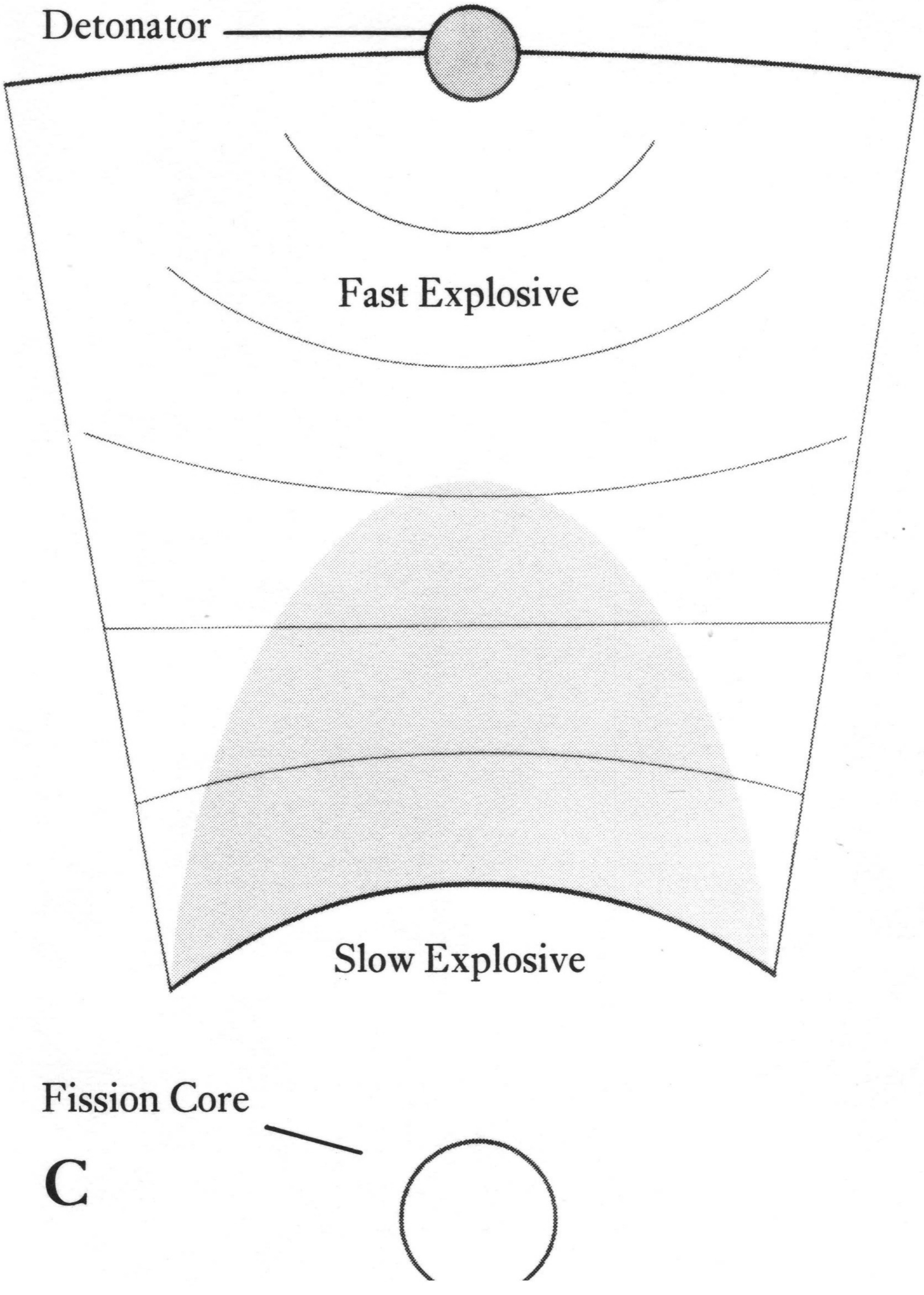
Nuclide	Reflector	Thickness (cm)	Critical mass (kg)
Uranium-235	None		49
Uranium-235	Beryllium	10	14
Uranium-235	Natural uranium	10	18
Plutonium-239	None		12.5
Plutonium-239	Beryllium	5.2	5.4
Plutonium-239	Beryllium	32	2.5
Plutonium-239	Natural uranium	5	6.4
Plutonium-239	Natural uranium	24	4.4

Source: Argonne National Laboratory, *Reactor Physics Constants* (US AEA









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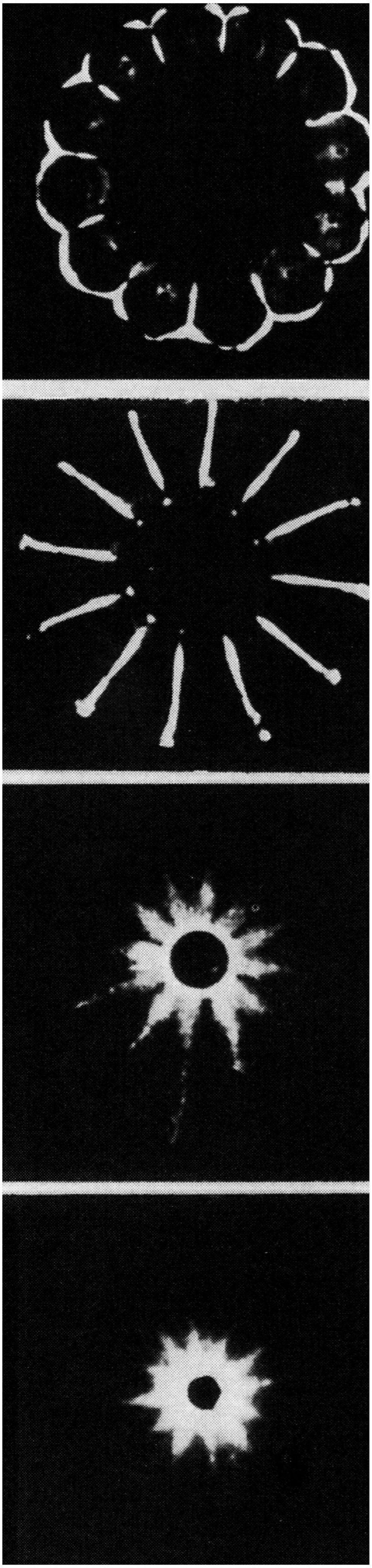

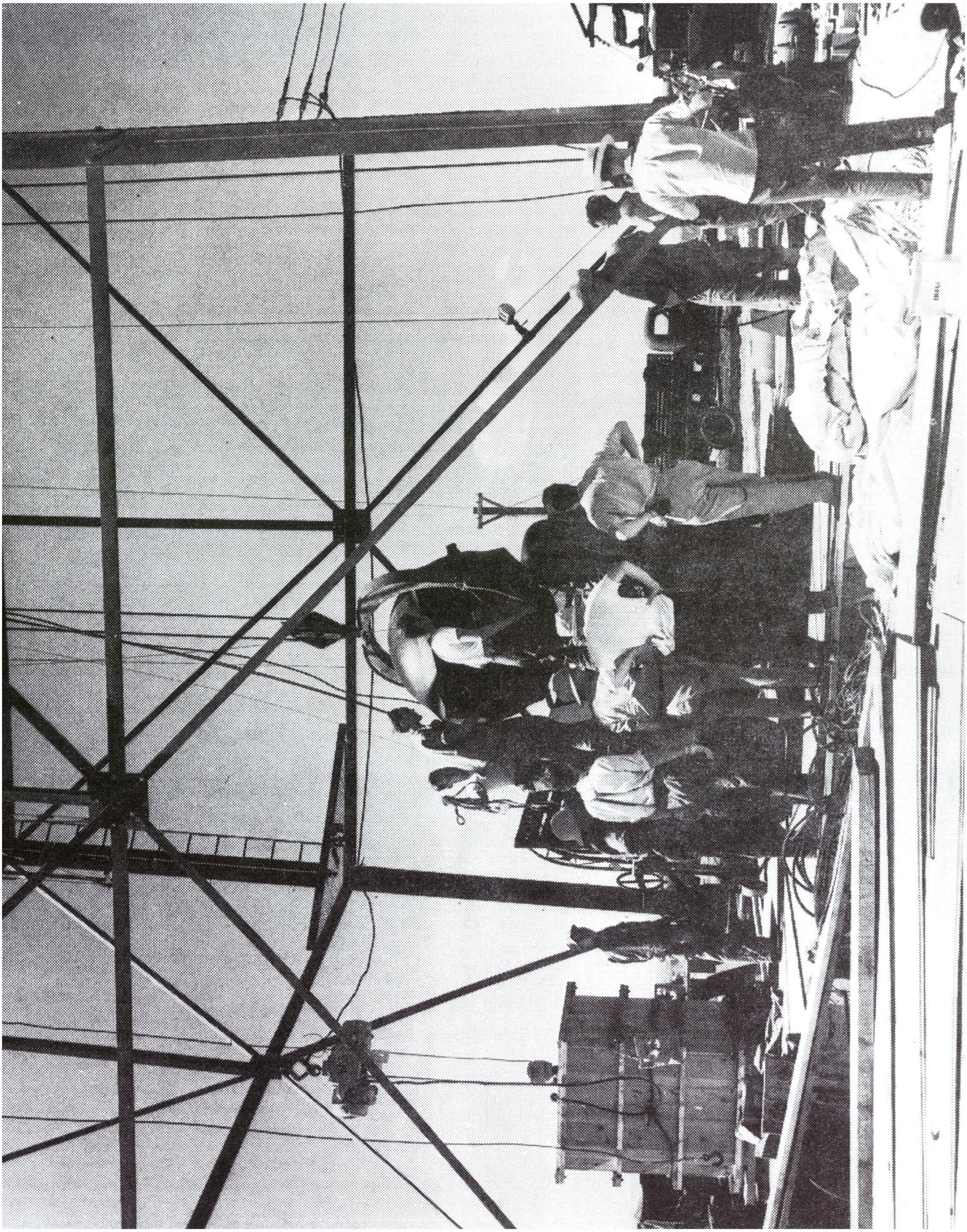

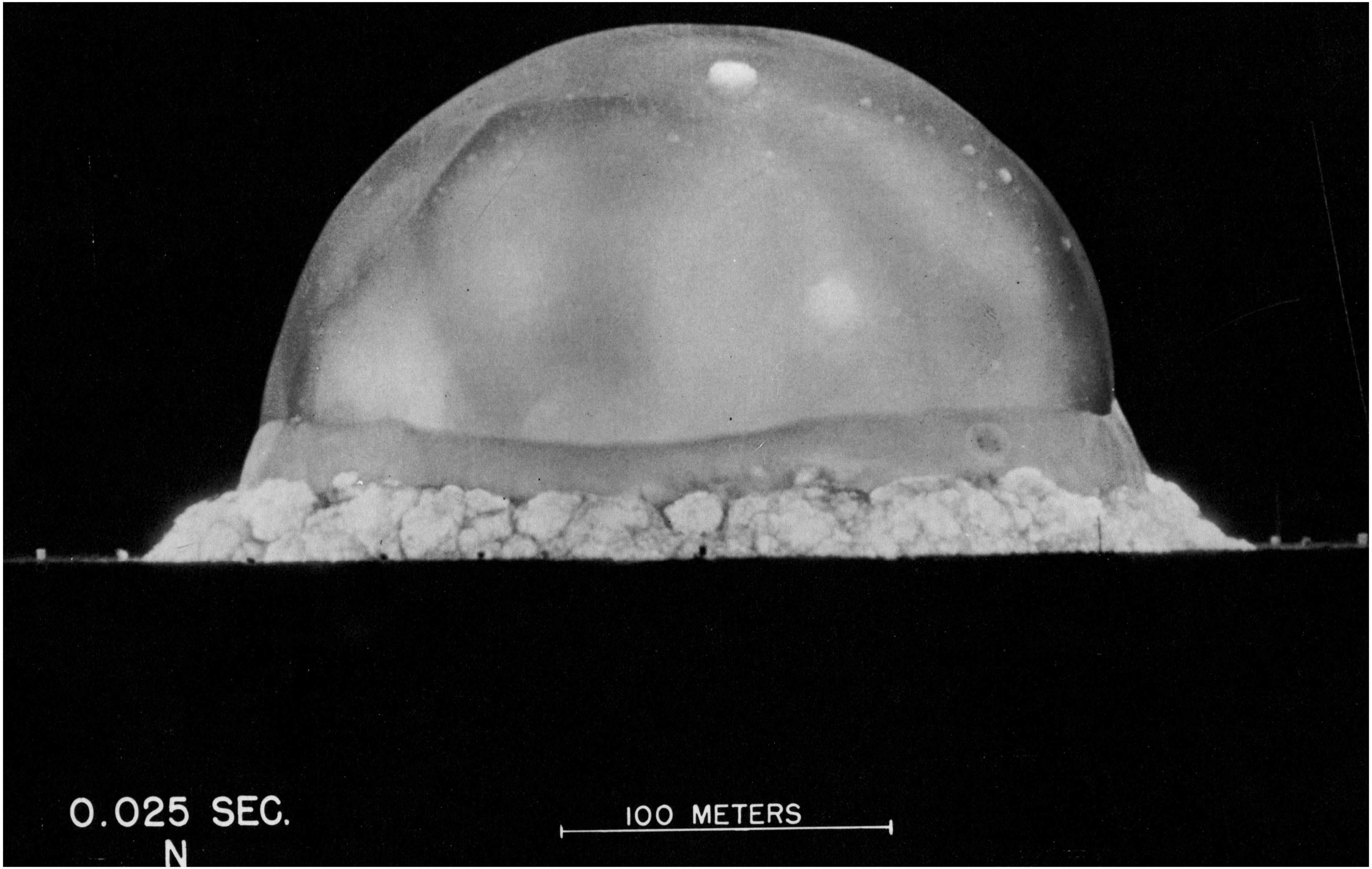
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100 METERS

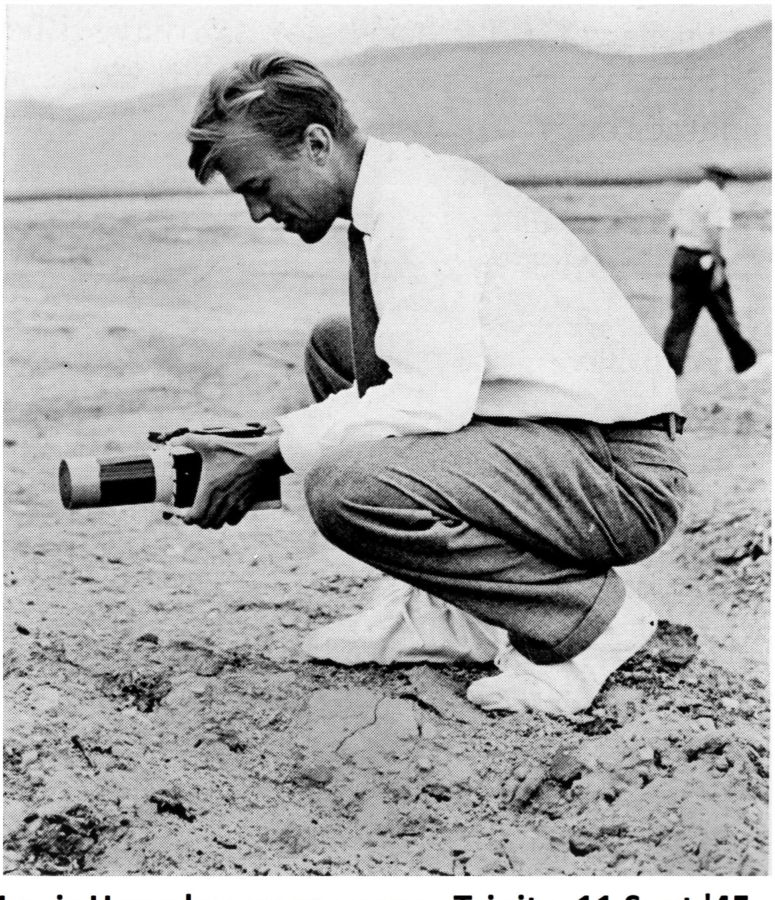
TRINITY CRATER: 9 WEEKS

11 SEPT. '45

JRO

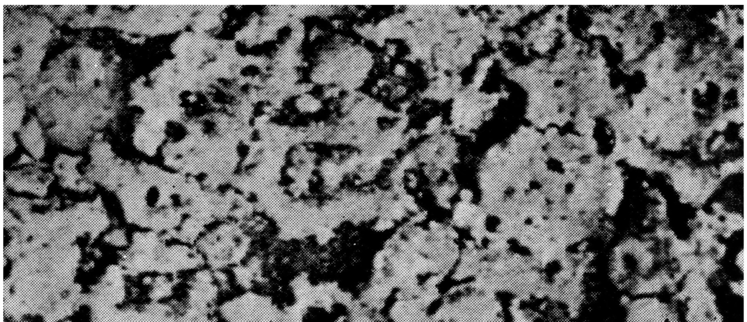
Louis H. Hemplemann (Health Physicist)

Robert Bacher



Louis Hempleman measures Trinity, 11 Sept '45

9 weeks after Trinity (11 Sept. 1945): GZ is down from ~8000R/hr at 1 hour to ~1.4R/hr



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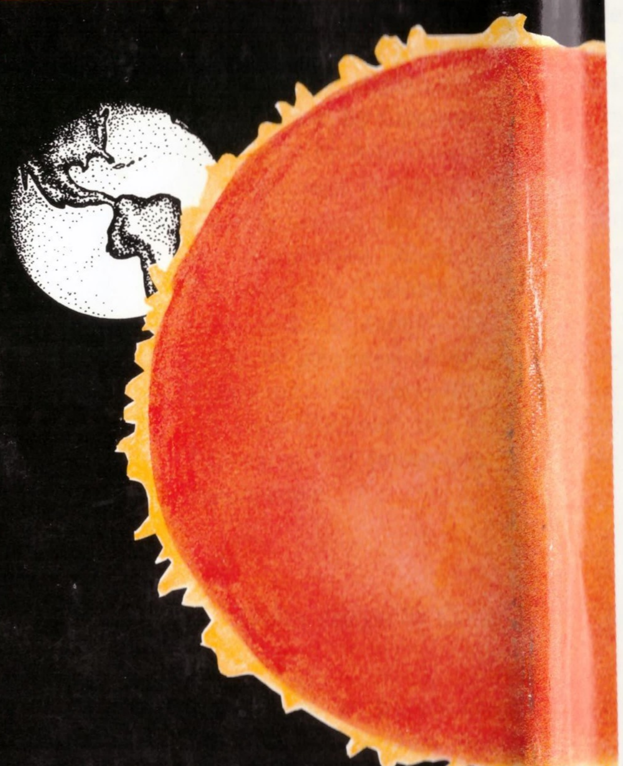
Sand fused to glass-like structure where test bomb exploded in New Mexico.

ENERGY & CONFLICT

The Life and Times of EDWARD TELLER



by Stanley A. Blumberg and Gwinn Owens

ENERGY & CONFLICT

The Life and Times of

EDWARD TELLER

by Stanley A. Blumberg and Gwinn Owens

"They manage to make the complex issues consistently interesting reading."
—*Publishers Weekly*

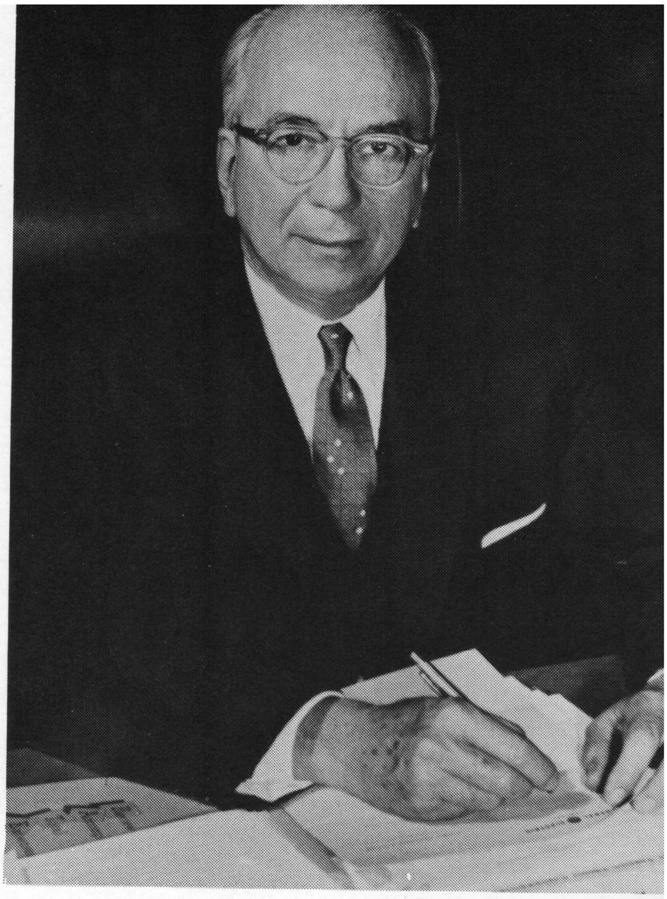
Here is the first biography of Edward Teller, based on exclusive access to the man and the archives. This is the life story of perhaps the most controversial and certainly one of the greatest nuclear physicists of the twentieth century. Widely known as the father of the hydrogen bomb, Teller is a genius among giants in the scientific community, his career coterminous with the nuclear age. His controversy with Robert Oppenheimer, here updated, constitutes, of course, one of the dramatic high points of the Cold War, in which Teller has been an absolutely crucial figure.

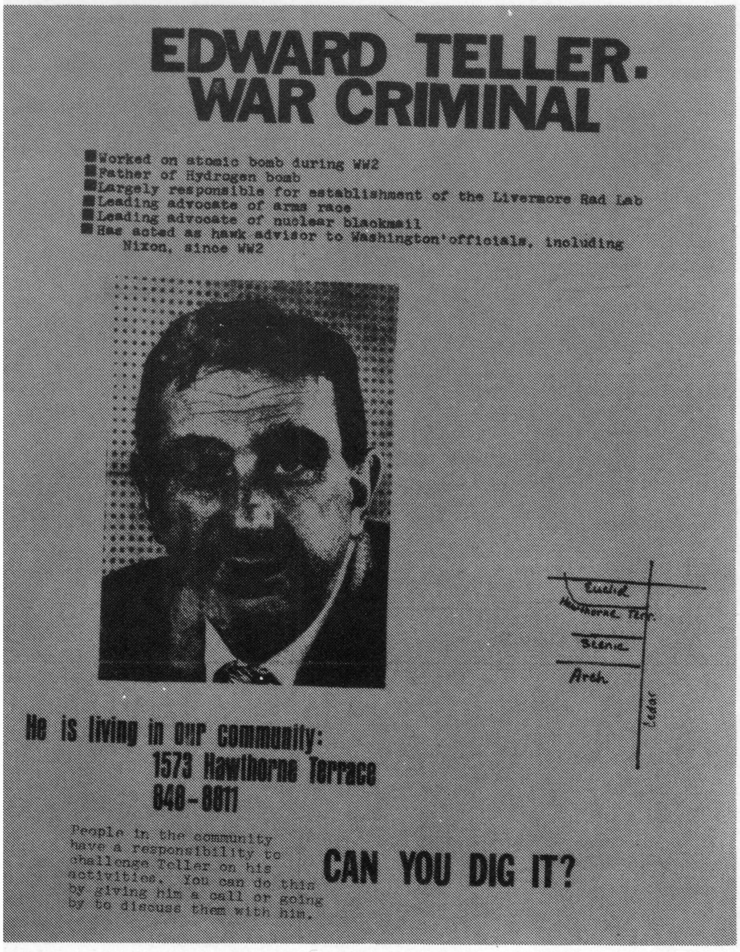
Messrs. Blumberg and Owens, with political leanings often different from Teller's, have written an objective book. Indeed, Teller's full cooperation was conditional on their objectivity. This included the release of his correspondence and his arranging for the declassification of key papers by the former Atomic Energy Commission.

A major revelation among many first-time disclosures is the fact that, contrary to pre-

(Continued on back flap)

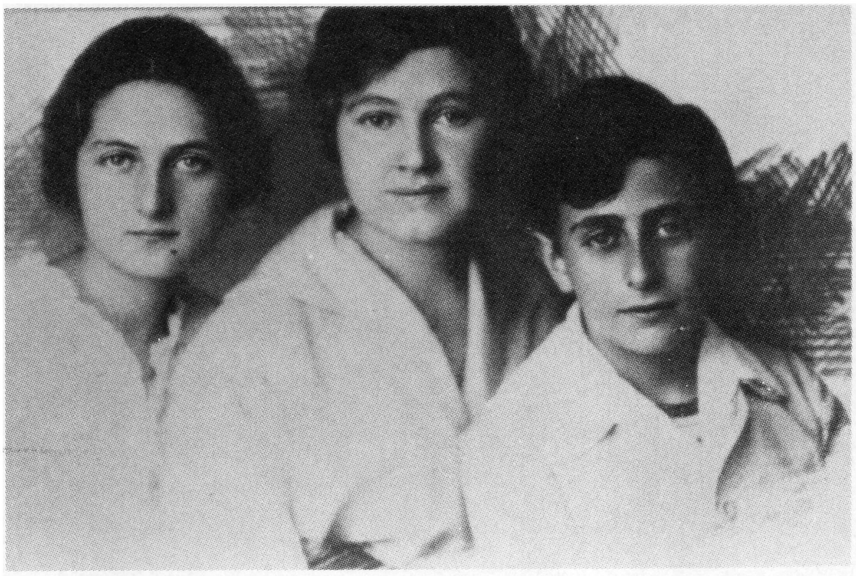
Rear Admiral Lewis L. Strauss, Teller's close personal friend and political ally. Strauss was chairman of the AEC during the Oppenheimer hearing. This portrait was taken in 1959, when Strauss was Eisenhower's Secretary of Commerce designate, just before an embittered U.S. Senate refused to confirm his appointment.



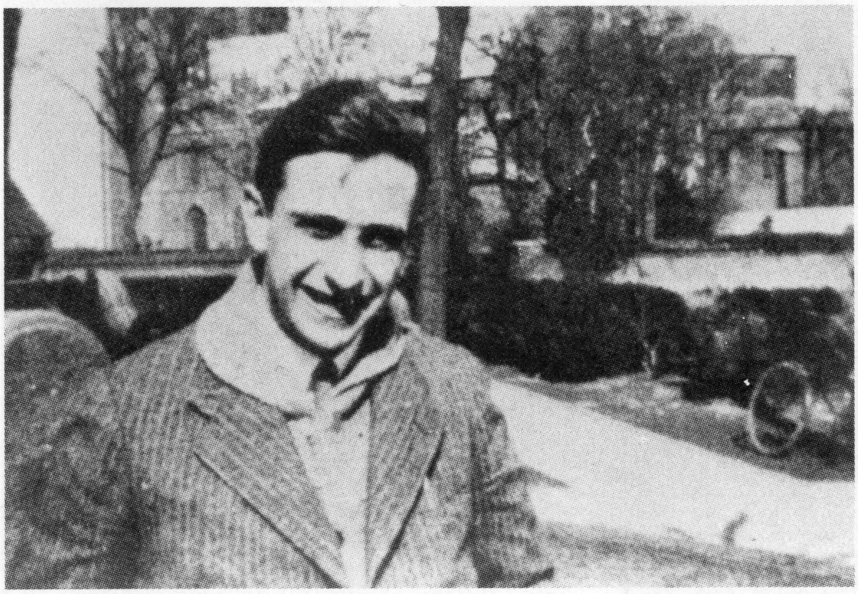


Circular distributed by Berkeley radicals prior to the "trial" of Edward Teller by a "war crimes tribunal" on November 23, 1970. The "trial" ended with a mob marching toward Teller's house, some of them threatening to burn it down.

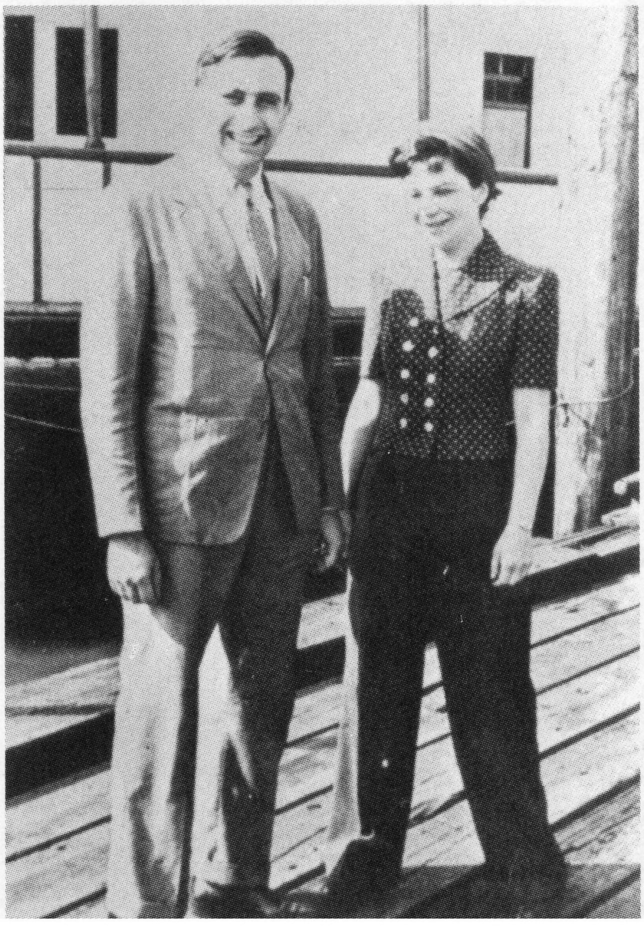
Dr. John A. Wheeler, the celebrated Princeton physicist who was the first American to learn that German scientists had split a uranium nucleus, paving the way for the nuclear age. Wheeler has for many years been a colleague and defender of Teller.



Preteen Edward Teller with his sister, Emmi *(left)*, and mother. *Teller Family Archive*.



Nineteen-year-old Edward Teller as a student in Germany. *Teller Family Archive*.



Edward Teller and his wife, Mici, shortly before he joined the Atomic Bomb Project at Los Alamos. *Teller Family Archive*.

A BIOGRAPHY

Edward Teller

GIANT OF THE GOLDEN AGE OF PHYSICS

STANLEY A. BLUMBERG

>$24.95
$34.95 IN CANADA

Crucial reading for an understanding of the nuclear age, Blumberg and Panos's life of Edward Teller is definitive for our time. Authoritative but never "authorized," it is an intimate, objective account based not only on extended, exclusive access to Teller, but also on exhaustive research among his colleagues and critics.

Teller's long life is coterminous with the epochal history of this century, and the authors bring into focus Teller's scientific contributions against a backdrop of monumental events in the world at large. Among their revelations is confirming evidence of how the USSR beat the United States in firing the first thermonuclear device and operating the first deliverable hydrogen bomb. The authors also reveal the stunning fact that the Joint Chiefs of Staff once pressed President Eisenhower to launch a "preventive war" against the Soviet Union on evidence of the Russians' H-bomb research. Teller himself has often been a shaping figure in this history, in the development of fusion power, of the atomic bomb and the hydrogen bomb, of the Strategic Defense Initiative ("Star Wars"), and of the missile defenses of Israel.

Edward Teller addresses the traumatic Oppenheimer affair and tells of Teller's ostracism and his bitter political controversies, but the book delineates, as well, his genius as a scientist and his profound devotion to democracy and to totally free exchange of scientific findings. Whatever his flaws, Teller emerges as a prodigious achiever, and this biography is a vivid refutation of the media distortion of him as a "Dr. Strangelove," showing him to be a good

"It's a remarkable book, a full and fair account of Teller the scientist, Teller the politician, Teller the aggressor, Teller the vulnerable."

—Mike Wallace, Correspondent, CBS News/*Sixty Minutes*

"For those of us who never hoped to understand just why it is that E is equal to mc squared, this biography of a great physicist is important primarily because we come to know a great man. His contributions as a statesman are the equal of his contributions as a scientist. Messrs. Blumberg and Panos have met the extraordinary challenge of portraying this complicated, delicate, determined idealist."

—William F. Buckley

"Teller's lifetime passion for both peace and freedom is linked to his understanding that the greatest threat to both comes from weakness, not from strength. Only a mind as brilliant as Teller's could have connected the fields of physics and politics, first by helping to create nuclear deterrents and then by proposing strategic defenses against those, once freedom's enemies acquired them."

—Jack Kemp

"Edward Teller is a great scientist who has always had a commitment to the defense of his adopted country and of the free world.... Few scientists in this century have had such an impact.... Those who know him admire him as a warm human being, always ready to help a friend, a student, or a good cause."

—Yuval Ne'eman,
Chairman, Israel Space Agency

"A thoughtful perspective on the life and times of Edward Teller."

—Henry Kissinger

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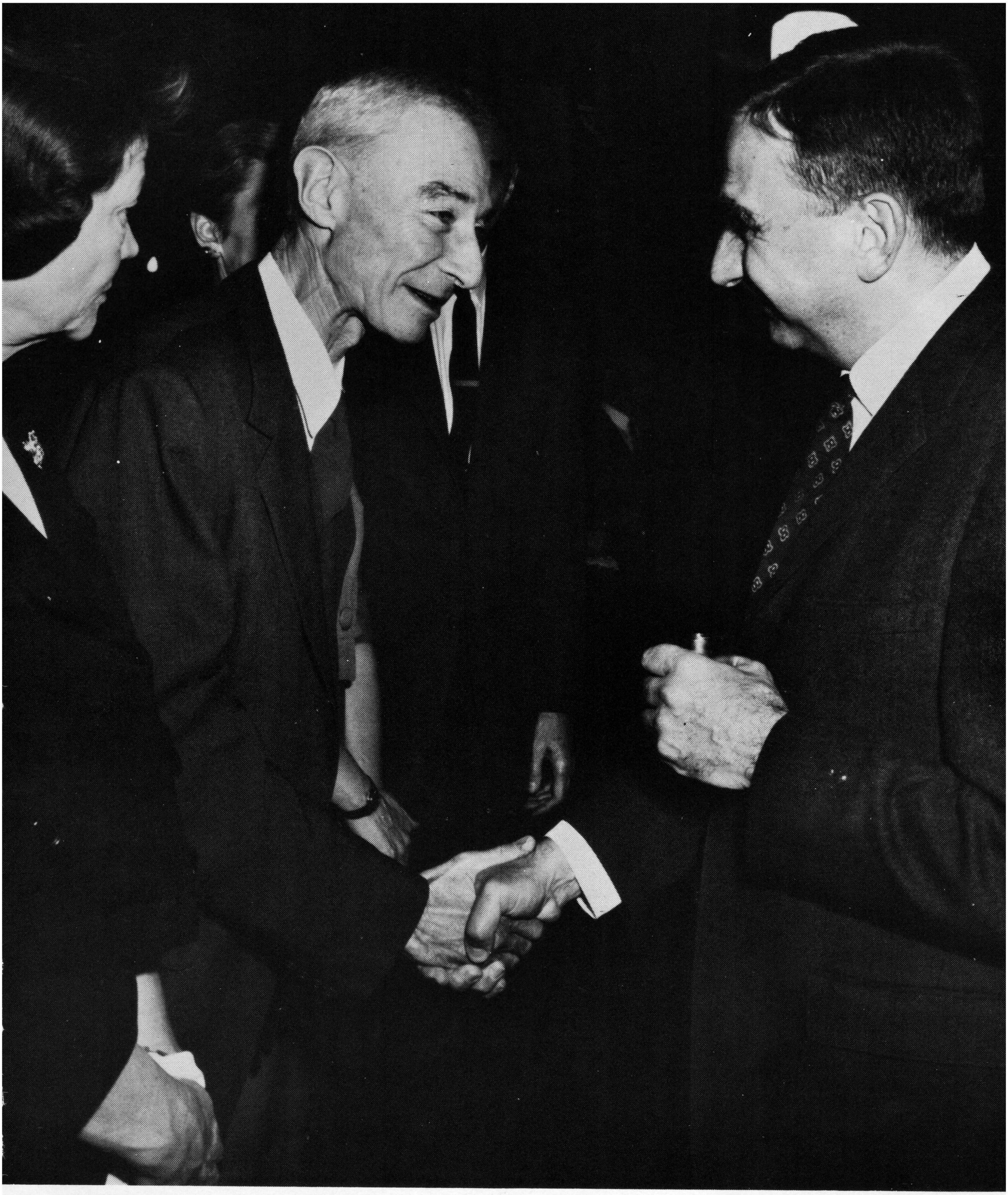

On December 2, 1963, exactly ten years after he was charged with being a security risk, J. Robert Oppenheimer received the prestigious Fermi Award from President Lyndon Johnson. After the White House ceremony, Teller, who had won the award in 1962, warmly congratulated his longtime rival. At the time the gesture seemed to symbolize the end of the long and bitter rivalry between the supporters of the rival scientists, but the ill feeling, though Teller and Oppenheimer may have personally made their peace, continued to divide the scientific world for at least another decade.

(Ralph Morse, Time-Life Picture Agency © Time Inc.)

SECRET

LOS ALAMOS
SANTA FE, NEW MEXICO
P. O. BOX 1663

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JRO #3

May 25, 1943

C257

Dr. Enrico Fermi
Metallurgical Laboratory
University of Chicago
Chicago, Illinois

Dear Fermi:

I wanted to report to you on the question of the radioactively poisoned foods, both because there are some steps that I have taken, and because Edward Teller has told me of the difficulties into which you have run.

When I was in Washington I learned that the Chief of Staff had requested from Conant a summary report on the military uses of radioactive meterials and that Conant was in the process of collecting the material for that report. I therefore, with Groves' knowledge and approval, discussed with him the application which seemed to us so promising, gave him a few points of detail and some orders of magnitude. I raised the question of what steps, offensive and defensive, should be taken in this connection. It is my opinion, and it was also Conant's, that the defensive measures would probably preclude our carrying out the method ourselves effectively, and therefore I asked that in his report the question of policy be raised as to which of these lines we should primarily follow. This report, and you will undoubtedly have heard of it in other connections, is to go directly to General Marshall so that it will have authoritative if not expert consideration. I hope to discuss the question further when Conant visits here in ten days.

I also plan to go into the matter a little more deeply with Hamilton, although of course only on the physiological side. As you know, he has already made studies of the strontium which appears to offer the highest promise, and he expressed his willingness to look into these questions more fully. I think that I can do this without in any way indicating the nature of our interest, but it will be some time, perhaps three weeks, before I get to see him.

I understand the difficulties that you have had in getting this subject developed without telling anyone about it,

CLASSIFICATION CANCELLED

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and it is hard for me to give very sound advice on what to do. I think that there is at least one quite well defined radio-chemical problem, which is the separation of the beta-strontium from other activities. It is my impression after talking it over with Teller, that this is not a very major problem except in so far as provision would have to be made for carrying it out by remote control at the actual site of operations. I do not see how this can be done without letting a number of people into the secret of why we want the strontium. I should therefore like to ask you what you think the latest safe date is for the solution of this and other problems. It seems to me that we have a much better chance of keeping your plan quiet if we do not start work on it until it is essential to do so. If, in your opinion, the time for such work is now, I believe that you should discuss it with Allison and Franck and on their advice, if absolutely necessary, with Compton, and that perhaps this group of people will be enough to get the work done without more wide-spread discussion. In a general way I think we have better facilities here for keeping things of that kind within a well definied group, namely, the scientific personnel of the laboratory, than exists in other places. On the other hand, I do not think that we are equipped to tackle the problem with anything like the expedition that you can in Chicago.

//To summarize then, I should recommend delay if that is possible. (In this connection I think that we should not attempt a plan unless we can poison food sufficient to kill a half a million men, since there is no doubt that the actual number affected will, because of non-uniform distribution, be much smaller than this.) If you believe that such delay will be serious, I should recommend discussion with a few well-chosen people. Finally, I should postpone this action until I have had an opportunity to reopen the question with Conant and if possible to obtain information on the decision of the General Staff.//

Things here are going quite well and we are still remembering with pleasure and profit your fine visit. I hope that you can come again late in June, and that we shall have at that time some less programatic problems to discuss with you.

With all warm greetings,

Robert Oppenheimer

Robert Oppenheimer

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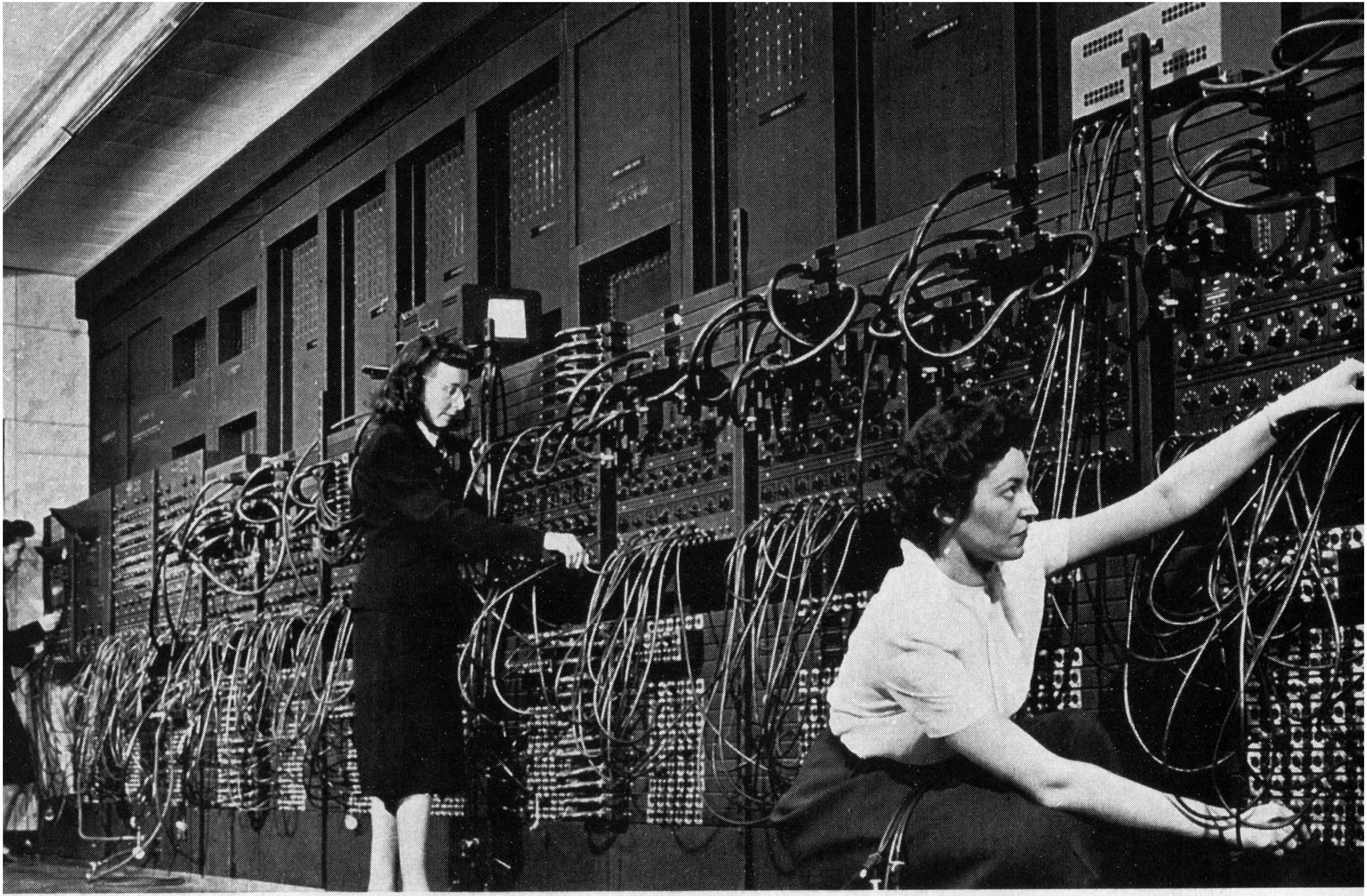
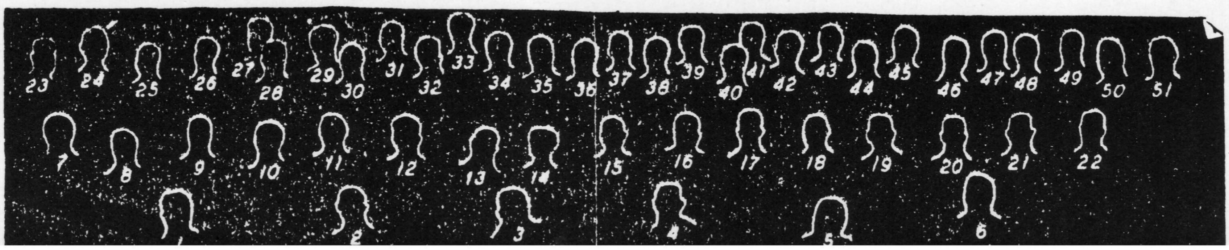
Teller & Fermi, Chicago Univ.



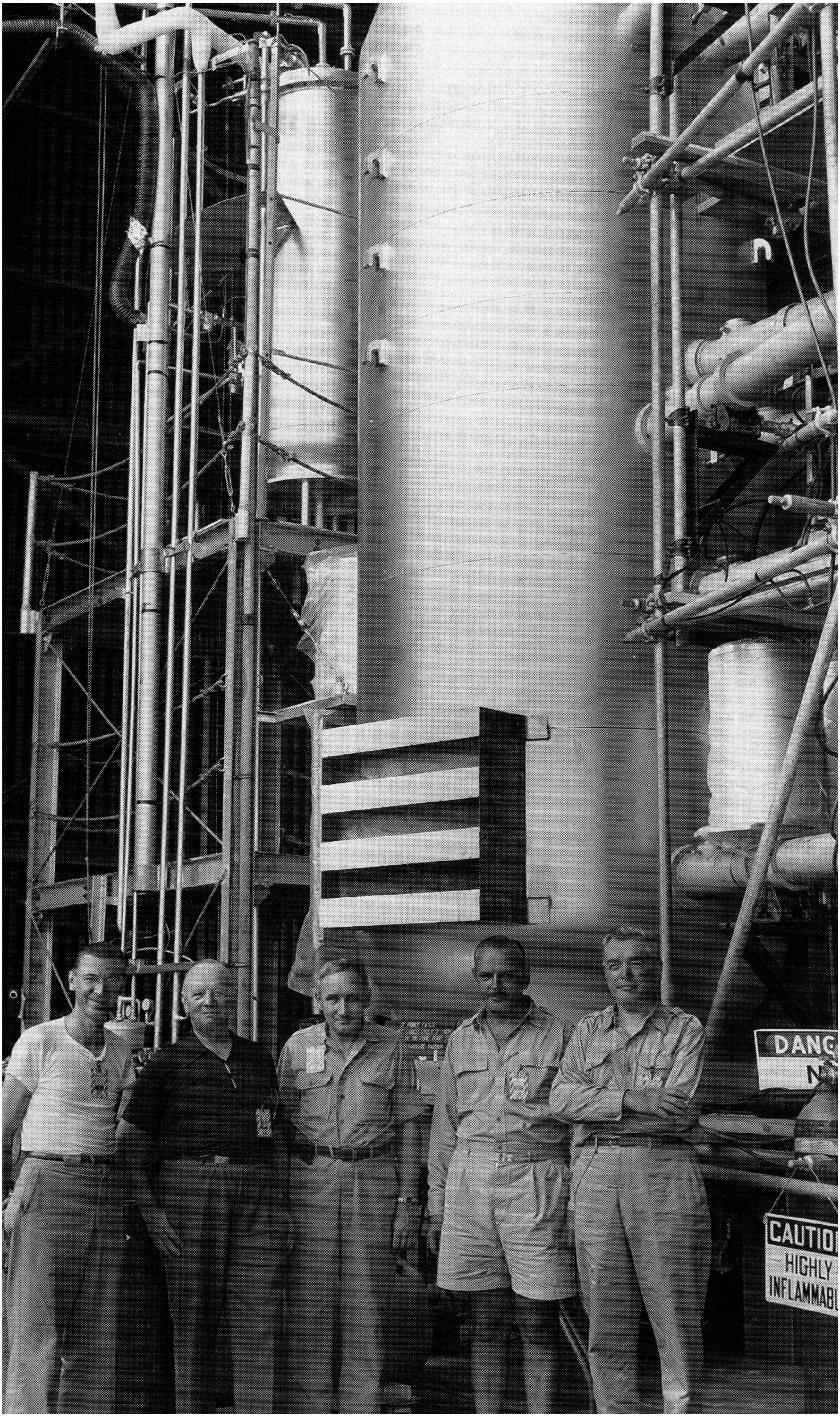
ENIAC H-BOMB COMPUTER 1946

These were the participants in the fifth Washington Conference on Theoretical Physics, thrown into a turmoil when Niels Bohr (first row, fourth from left) interrupted the proceedings to announce that a month earlier, in Germany, the chemists Hahn and Strassman had split a uranium nucleus. The world was never the same again.

1 - Stern, Carnegie Tech, Pittsburgh
2 - Fermi, Rome, Columbia
3 - Fleming, Carnegie Institution of Washington
4 - Bohr, Copenhagen, Princeton
5 - London, Duke, Paris
6 - Urey, Columbia
7 - Brickwedde, National Bureau of Standards
8 - Breit, Wisconsin, Carnegie Institution
9 - Silsbee, National Bureau of Standards
10 - Rabi, Columbia
11 - Uhlenbeck, Columbia
12 - Gamow, George Washington
13 - Teller, George Washington
14 - Mrs. Mayer, Johns Hopkins
15 - Bitter, Massachusetts Institute of Technology
16 - Bethe, Cornell
17 - Grayson-Smith, Toronto
18 - Van Vleck, Harvard
19 - Jacobs, Massachusetts Institute of Technology
20 - Starr, Massachusetts Institute of Technology
21 - Hebb, Duke
22 - Squire, Pennsylvania
23 - Kuper, U.S. Public Health Service
24 - Mahan, Georgetown
25 - Myers, Maryland
26 - Roberts, Carnegie Institution of Washington
27 - Critchfield, George Washington
28 - Baroff, U. S. Patent Office
29 - Bohr, Jr., Copenhagen
30 - Meyer, Carnegie Institution of Washington
31 - Herzfeld, Catholic University
32 - Lord, Johns Hopkins
33 - Inglis, Johns Hopkins
34 - Wulf, U. S. Department of Agriculture
35 - Wang, Peking, Carnegie Institution of Washington
36 - Johnson, Carnegie Institution of Washington
37 - Mohler, National Bureau of Standards
38 - Scott, National Bureau of Standards
39 - Vestine, Carnegie Institution of Washington
40 - Rosenfeld, Liege, Copenhagen, Princeton
41 - Seitz, Pennsylvania
42 - Diecke, Johns Hopkins
43 - Mayer, Johns Hopkins
44 - Hibben, Carnegie Institution of Washington
45 - Tuve, Carnegie Institution of Washington
46 - O'Bryan, Georgetown
47 - Hafstad, Carnegie Institution of Washington
48 - Cohen, Columbia
49 - Hoge, National Bureau of Standards
50 - Sklar, Catholic University
51 - Rossini, National Bureau



A galaxy of famous physicists gathered in front of Princeton's Sayre Hall to celebrate the success of the Mike thermonuclear test in November 1952. Niels Bohr is second from the right in the front row (wearing a scarf). Hans Bethe is to Bohr's right. Immediately behind them on the right of the second row are George Gamow and I. I. Rabi. John A. Wheeler is behind Gamow, and Eugene Wigner is at the extreme left of the second row. Teller is partially obscured in the center of the next to last row.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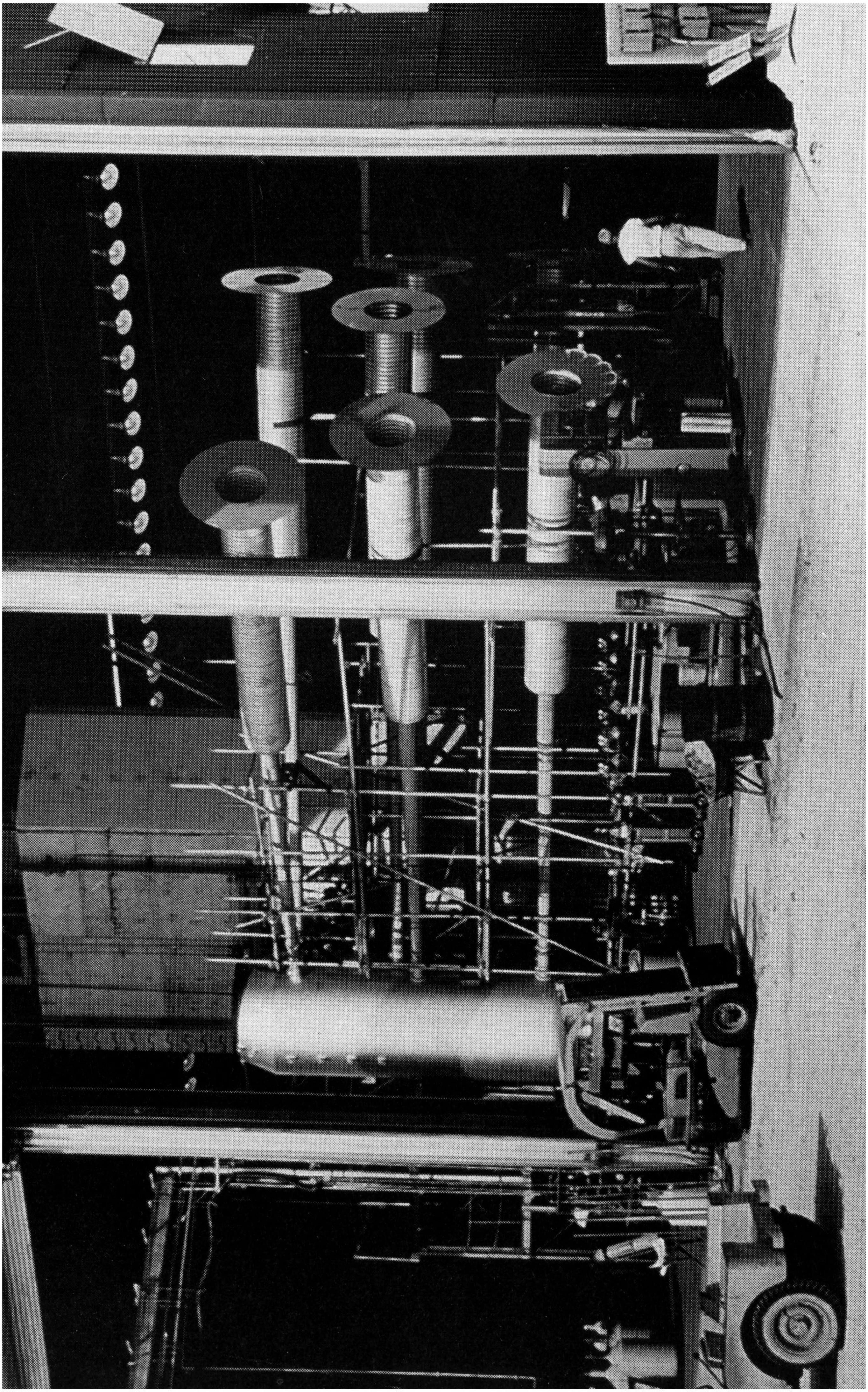
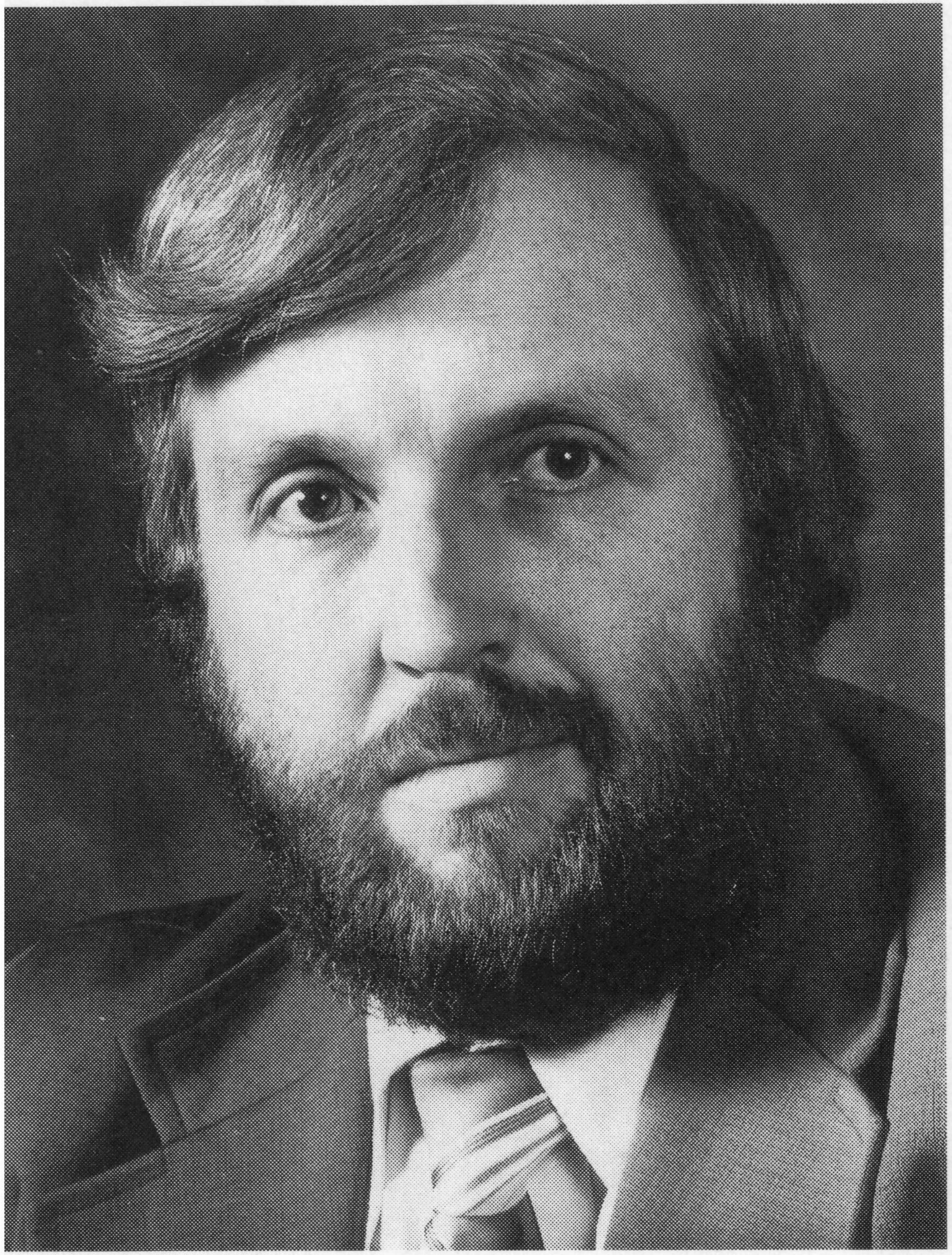
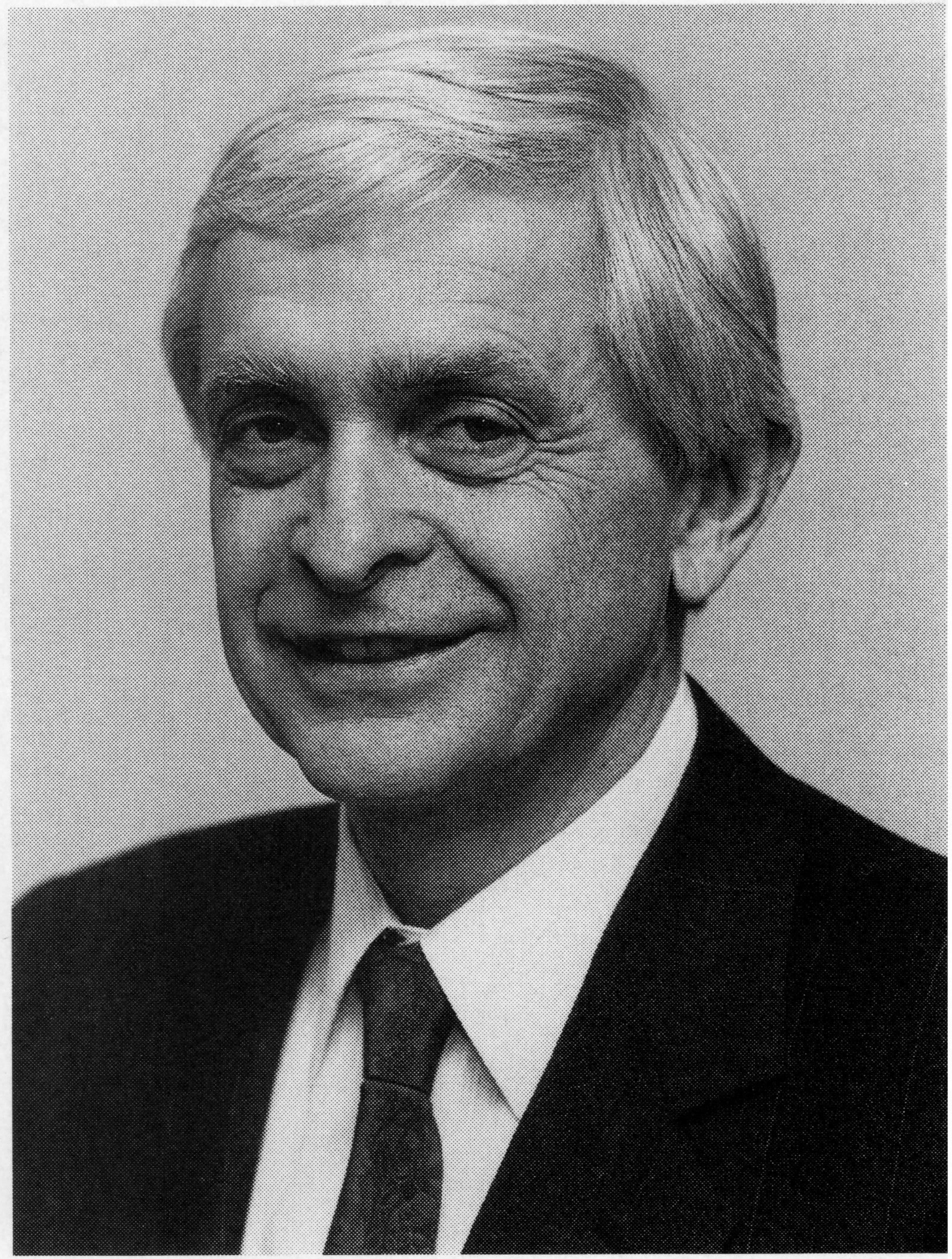


9000 ft. KRAUSE-OGLE X-RAY BOX, MIKE TEST



Lowell Wood, chief aide to Edward Teller and top recruiter of young scientists for nuclear weapons programs at Livermore. *Lawrence Livermore National Laboratory.*

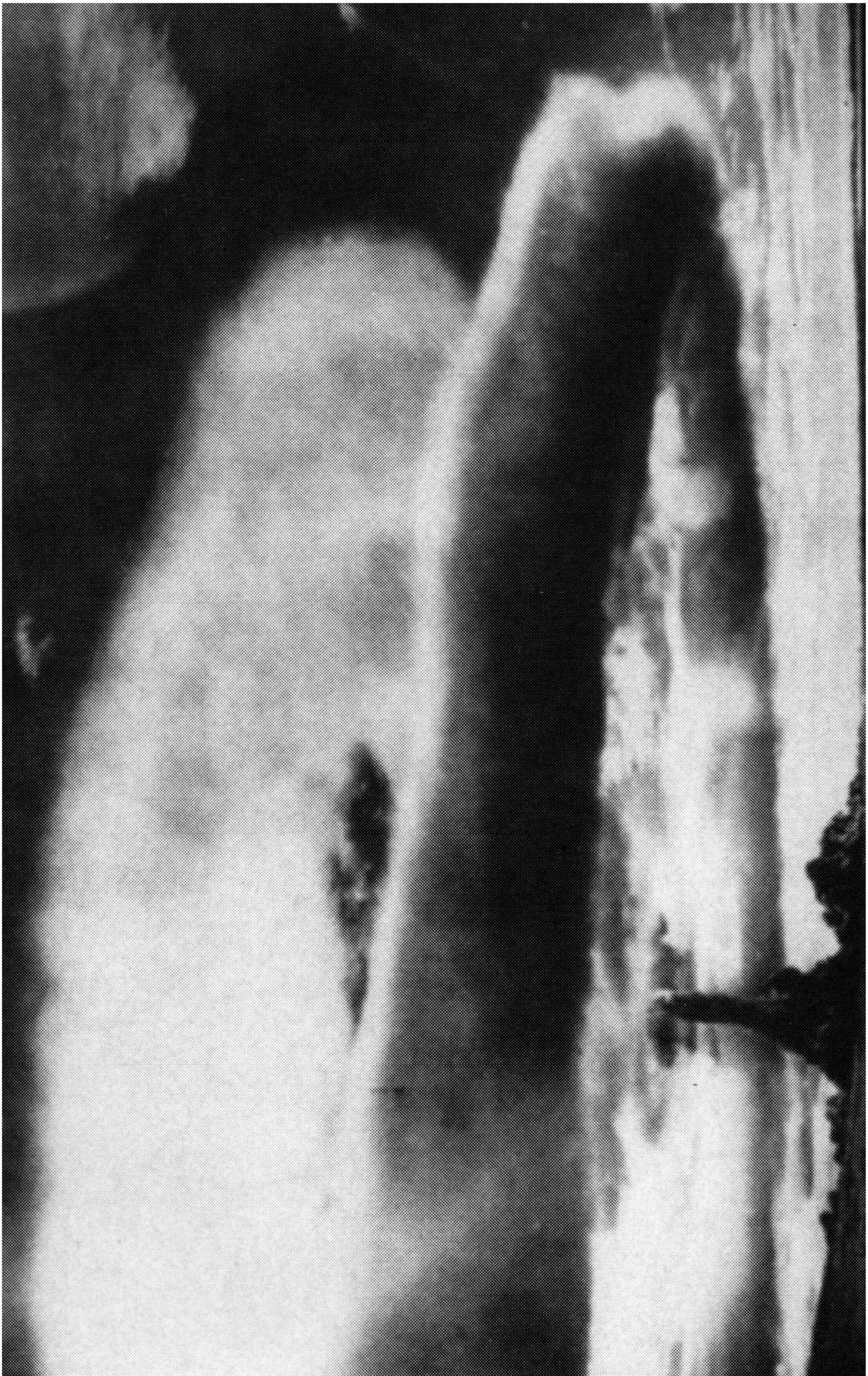


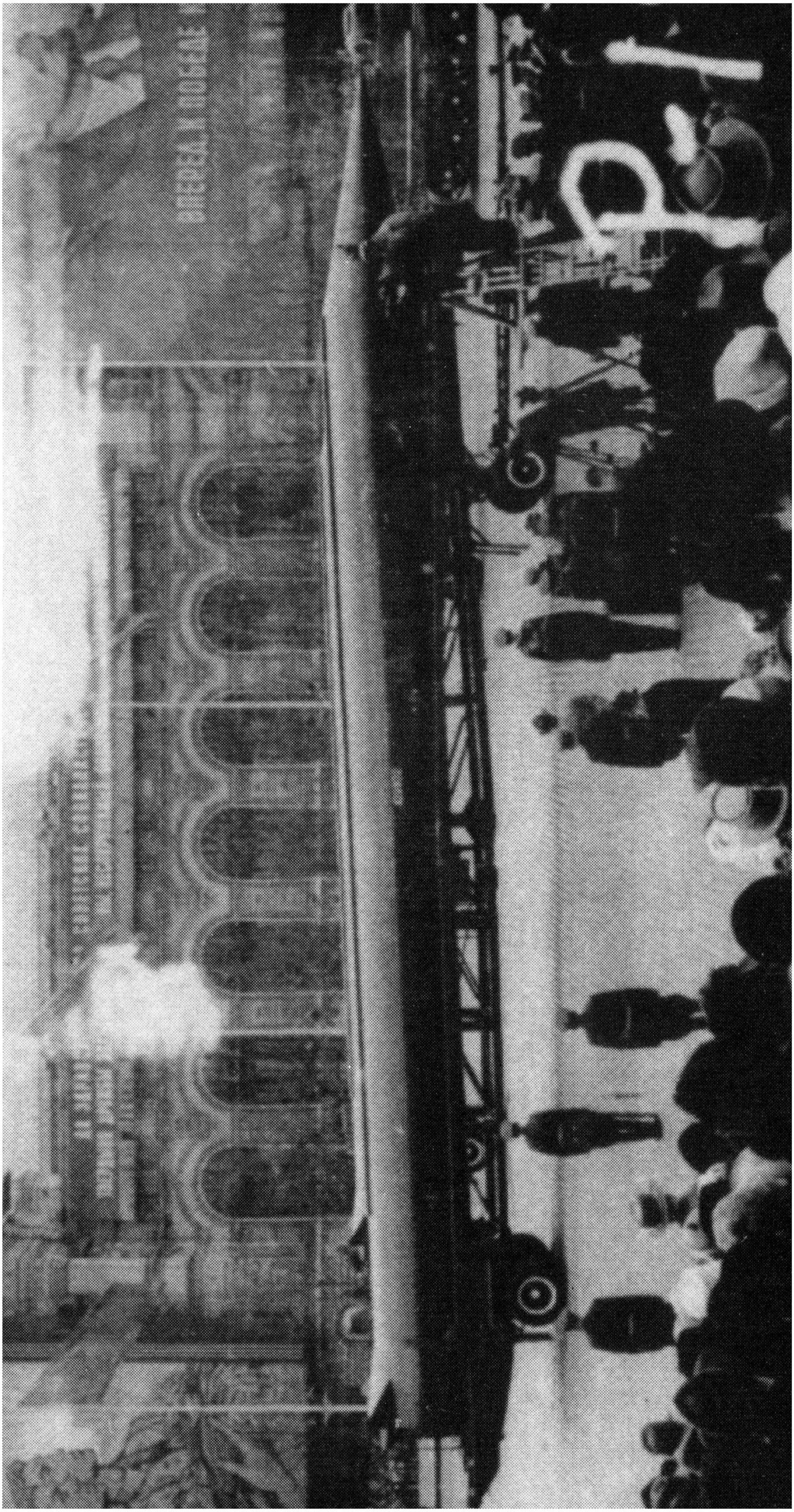
John Nuckolls, director of Lawrence Livermore National Laboratory as of May 11, 1988 (appointed 1987). *Lawrence Livermore National Laboratory.*

Edward Teller *(left)* and Yuval Ne'eman, Israeli physicist and government leader, confer in 1985 during one of Teller's frequent visits to the Middle East. *Isaac Freidin*.

Edward Teller *(left)* and Caspar Weinberger, former secretary of defense, confer during reception preceding the dinner in Washington, D.C., on November 16, 1988, at which Teller and Andrei Sakharov, Nobel Prize–winning Soviet physicist and human rights champion, met for the first time. © C. *Kane*.

Семипалатинский ядерный полигон





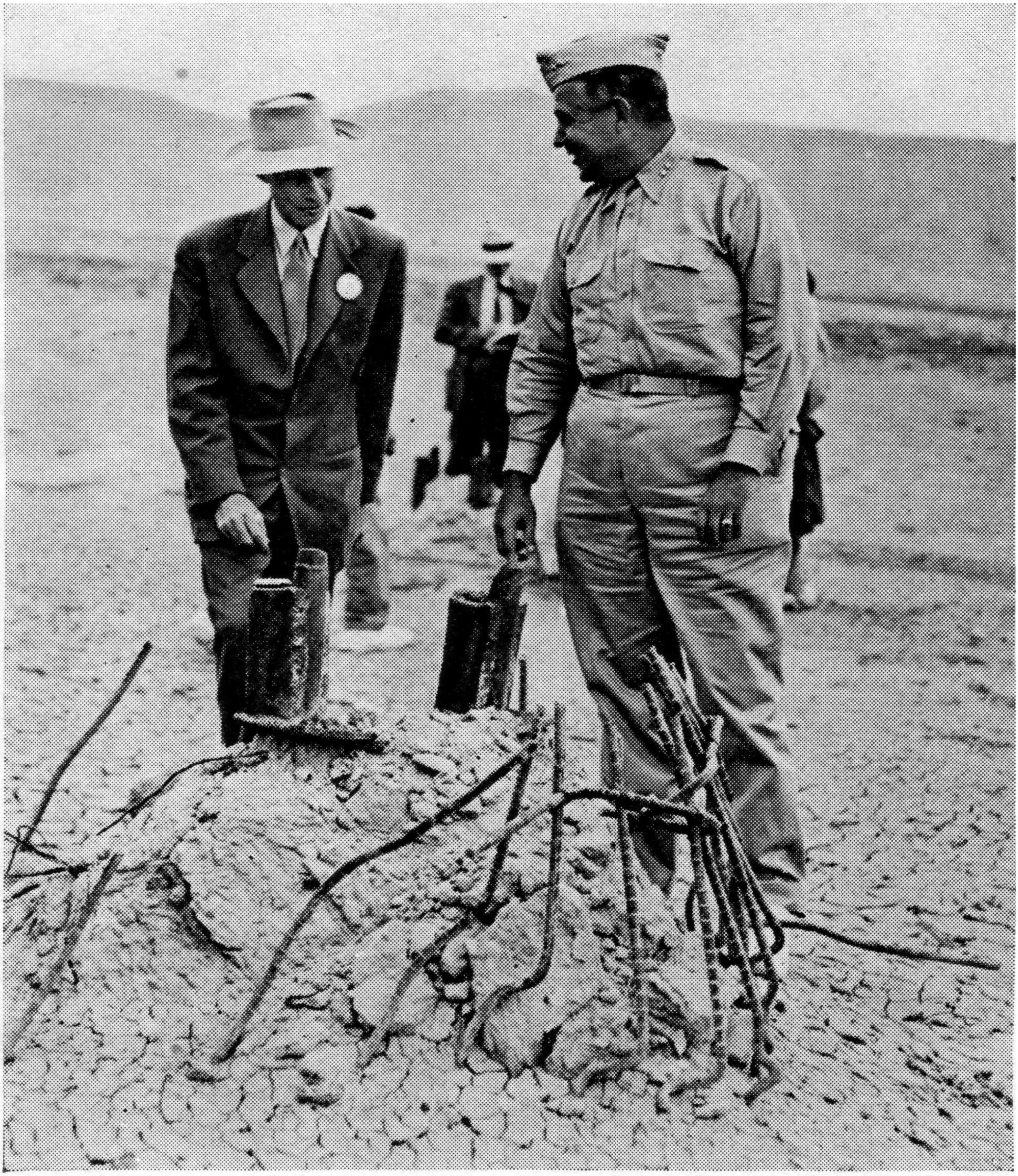


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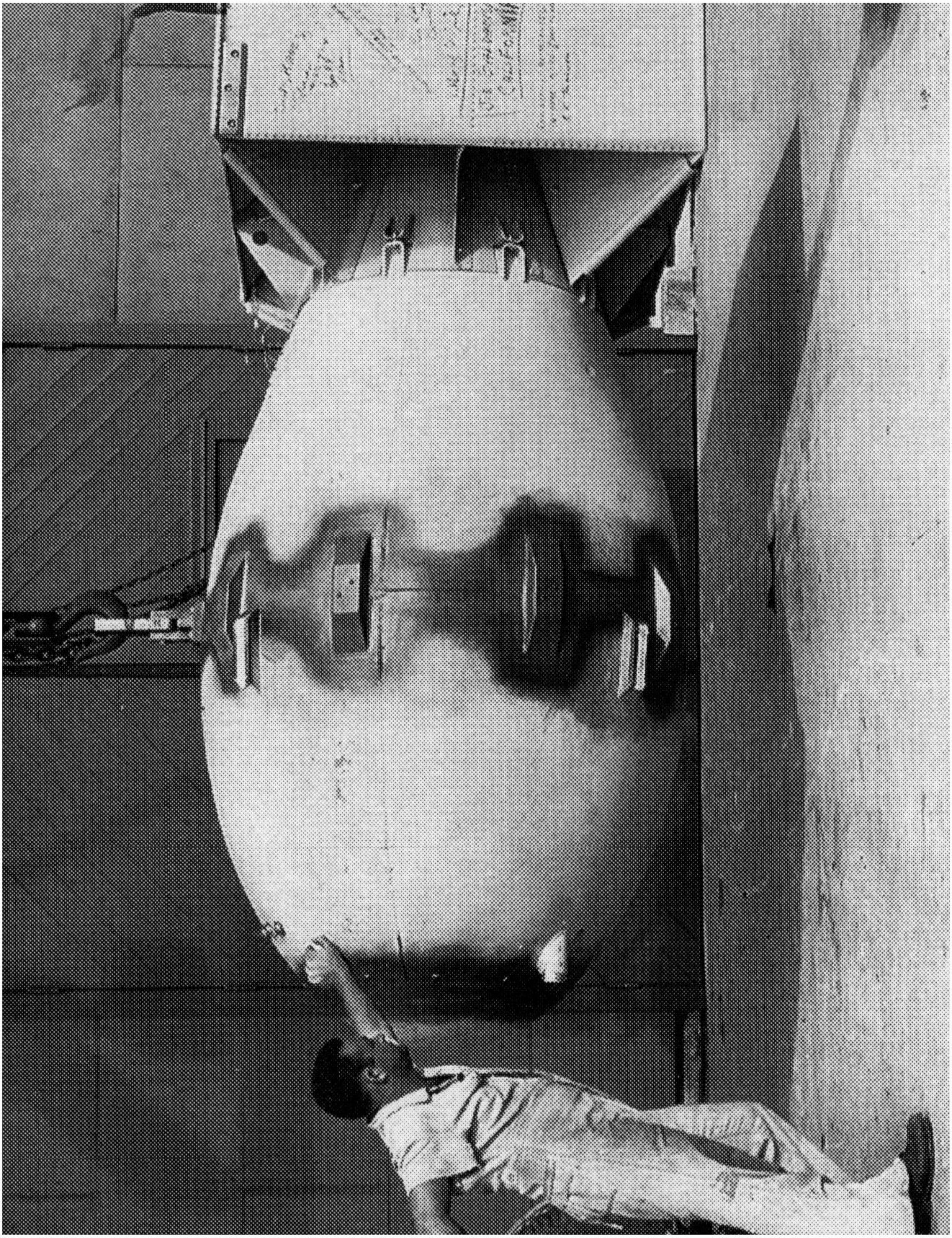
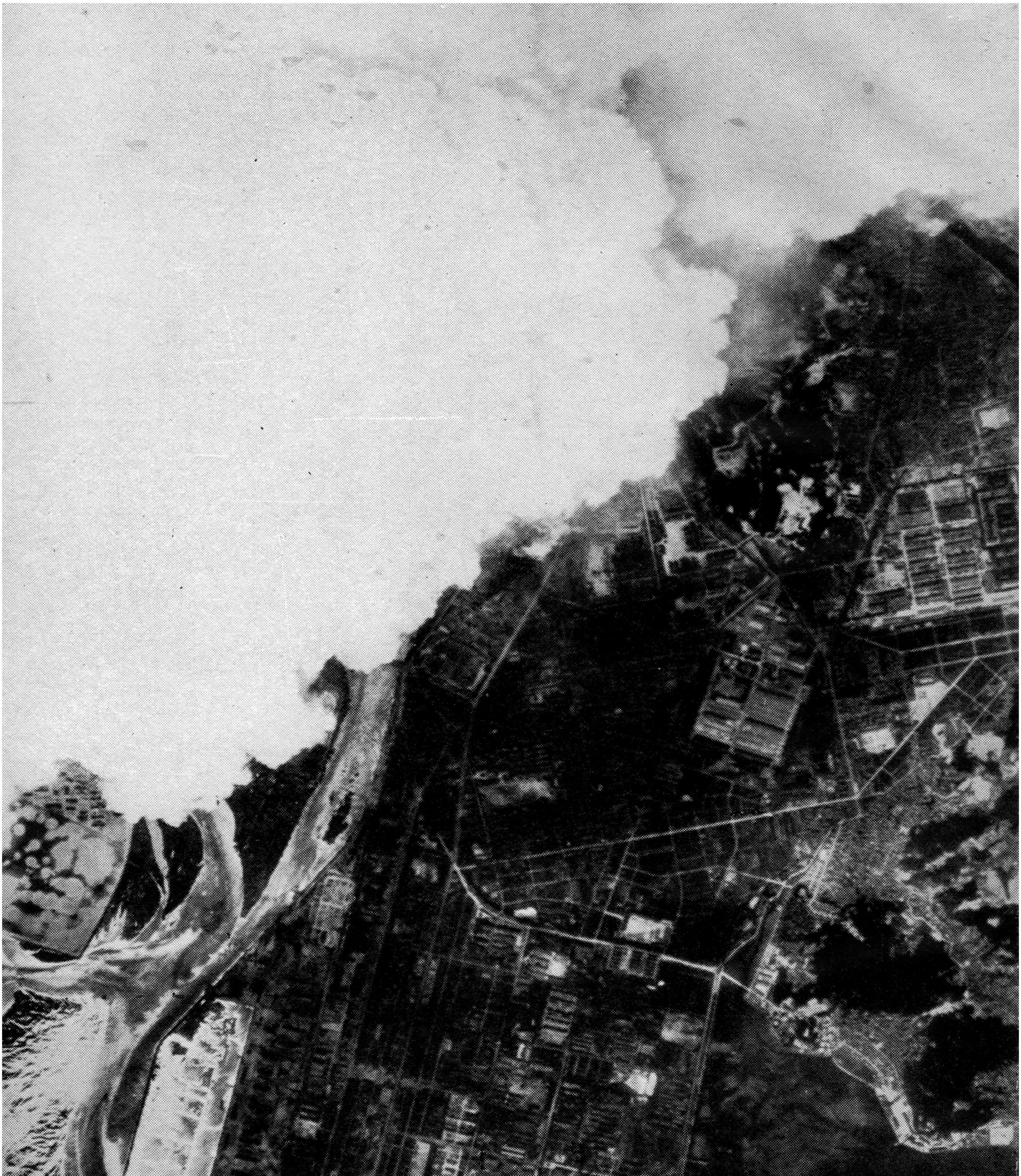
Figure 1. *All that remained of the steel tower from which the test bomb was dropped in New Mexico; the rest of it disappeared into the air as vapor. Left, Dr. J. R. Oppenheimer; right, Major-General L. R. Groves.*





Press Assoc., In

White smoke cloud rises from atomic bomb hit on Hiroshima

SANTA FE NEW MEXICAN

The Oldest Newspaper in the Southwest, Founded in 1849

Vol. 96, No. 213 | MEMBER AUDIT BUREAU OF CIRCULATIONS | SANTA FE, NEW MEXICO, MONDAY, AUGUST 6, 1945 | ASSOCIATED PRESS UNITED PRESS | Price 5c

Los Alamos Secret Disclosed by Truman

ATOMIC BOMBS DROP ON JAPAN

By WILL HARRISON

Last week's "Big I" handout from the Governor's office was today still reverberating in educational and legislative circles.

Governor Dempsey was quoted in the news handout as saying:

"During the 1943 Legislature I sponsored a bill which transferred all of the mineral leasing act funds, except that portion used for free textbooks and the Bureau of Mines, to the school equalization fund."

The act, in two years, has produced $1,165,173 for the school equalization fund.

Comes today a letter from Sen. J. H. Mullis of Roswell:

"Before the 1943 Legislature I conferred with J. D. Shinkle, superintendent of the Roswell schools, Col. E. L. Lusk of the New Mexico Military Institute, and Clarence E. Hinkle, president of the Roswell board of education, regarding legislation which would increase the teachers' salaries. We decided on three bills:

"1.—To transfer to the school fund, to be used to increase the teachers' salaries, the balance of the Mineral Leasing Act fund, mentioned by Governor Dempsey;

"2.—Reducing from 5 per cent to 3 per cent the amount allowed the Bureau of Revenue for collecting the sales tax;

"3.—Limiting the Commissioner of Public Lands to $100,000 per year.

"I had these bills prepared before the Legislature convened and Governor Dempsey had nothing to do with the preparation of these bills. It is my recollection that Governor Dempsey was opposed to the mineral funds bill because it took that amount from the general fund.

"I introduced the bills and with the help of the New Mexico Educational Association secured the passage of the first but the Governor had the other two killed."

As noted in this space Saturday, the teachers act which the Governor said "I sponsored" was permitted to pass only after the school lobby consented to support a Dempsey measure permitting the transfer of certain surplus administrative funds to the state general fund.

And after the "I sponsored bill" became law the administration even then tried to grab part of the mineral leasing money for other than school support. Nov. 20, 1943, state records show, Governor Dempsey's State Board of Finance ordered $85,612.16 of mineral leasing money transferred to the general fund. Educational groups put up a fight and on Nov. 29, 1943, the amount was returned on the authority of an Attorney General's opinion

Although the schools received during the past two years $1,165,173 as a result of the "I sponsored bill" a complete and truthful statement would show that funds almost equalling that amount were taken from the schools by Dempsey sponsored bills in the same Legislature that enacted the mineral leasing funds law.

The transfer law, for which Dempsey traded with the school lobby, in the past two years has taken $357,593.64 for the general fund that would otherwise have gone to schools. ($163,106.71 from surplus in emergency school tax administrative fund in 1945, and $95,000 in 1944; $69,486.93 from surplus in income tax administration fund in 1945, and $30,000 in 1944.)

A total of $514,000 from the Casual Indebtedness fund was transferred to the general fund when no deficit existed. This money, under administrations prior to Dempsey, would have been transferred to the schools as witnessed June 30, 1942, when Gov. John Miles transferred to the schools $145,761.24 of casual deficit funds which were not needed to meet actual deficits.

The transfers under Dempsey of casual deficit money to the state general fund were $262,000 in 1944 and $252,000 in 1945.

Net Gain $283,580

The sum of these losses to school funds is $871,593.64, leaving a net gain through the mineral leasing funds law of $283,580.

And that gain may be credited to Sen. J. H. Mullis of Roswell and the New Mexico Educational Association who first fought the administration and then traded out with the Governor for the increased revenue.

$700 STOLEN

Mrs. Ida M. Glynn, living in one of La Posada's cabins, reported to city police that $700 was stolen from a purse which she had hidden under a pillow in one of her rooms. The money included a $500 bill, police said.

Deadliest Weapons in World's History Made In Santa Fe Vicinity

Santa Fe learned officially today of a city of 6,000 in its own front yard.

The reverberating announcement of the Los Alamos bomb, with 2,000 times the power of the great Grand-Slammers dropped on Germany, also lifted the secret of the community on the Pajarito Plateau, whose presence Santa Fe has ignored, except in whispers, for more than two years.

Decision to locate the Atomic Bomb Project Laboratory on mesa an hour's drive from Santa Fe, meant that it was necessary for the Army Engineers to construct an entirely new town to house the workers and their families. Primary reason for selection of the isolated site was security.

Ranch School Site

When the Army took over the property early in 1943 there were a few buildings which had been occupied by the Los Alamos Ranch School. New buildings began going up at once. Today there are 37 in the main technical area and about 200 others on the property used for the project itself. Three hundred buildings containing 620 family units, also were constructed, as well as military barracks, hospital buildings and structures for administrative offices.

Dr. J. R. Oppenheimer, one of the foremost physicists in the country and director of the laboratory, came to the site during early stages of construction. Other scientists and technical workers followed soon after.

REVOLUTIONARY

News of the development at Los Alamos of an atomic bomb immediately raised conjecture regarding the potential industrial uses of the energy.

The power of the atomic force harnessed by scientists in the secret projects is almost beyond comprehension—one bomb packing the wallop of the bomb loads of 2,000 Superforts. Talk was at once heard of the possibility of the newly controlled energy replacing coal, electricity, gasoline, water as a source of power.

That the study of the subject will continue was assured by the appointment by the Secretary of War of a committee to carry on investigation of atomic energy.

Spokesmen for the Las Alamos project said they had not been informed if this meant post-war continuation of the mountain project.

Scientific groups which had been working on the project elsewhere in the country moved in rapidly, bringing their equipment with them. The Harvard cyclotron was in operation six weeks after it had reached the site.

Tortuous Route

Nearest railroad facilities are at Albuquerque and Santa Fe. This made it necessary to truck everything from those cities, at least. The road from Santa Fe is a tortuous one, and in the beginning, the last 18 miles were not paved. This was bad enough for passenger cars, and presented a particularly tough problem in hauling heavy loads.

Today the community has more than 6,000 residents. Slightly less than two-thirds are civilian men, women and children and the remainder military personnel. The post commandant is Col. Gerald R. Tyler.

First need of arriving personnel in mess halls, or in a large cafeteria, was housing. Various types were constructed, to meet different needs. There are three-room prefabricated, individual houses; three-room apartments, eight to a building, and four- and five-room apartments, four in a two-story unit. There are some hutments, Quonset-type huts and government and personally-owned trailers.

Bachelor Dorms

Dormitories have been constructed for unmarried personnel, or persons who do not have their families with them. Rents, for family groups, are based on earnings. Apartments are unfurnished and family groups ordinarily bring their furniture with them, although some items of government furniture have been available.

Housewives shop for food for daily meals at an army commissary where ration points are as important as elsewhere. A "trading post" offers items needed in everyday life and there are the usual post exchange stores.

Personnel living in dormitories eat There is also a dining room with waitress service.

City Dads, Too

A "town council" of eight elected members serves in an advisory capacity, meeting with representatives of the project and of the commanding officer. There is a school board, appointed by Colonel Tyler and Doctor Oppenheimer, which oversees operation of an accredited elementary school and high school. There

(Continued on Back Page)

Hi Johnson Dies at 79

WASHINGTON, Aug. 6 (AP)—Sen. Hiram W. Johnson of California, militant opponent of the League of Nations and the San Francisco Charter for a United Nations organization, died today.

The veteran Republican senator succumbed at Naval Hospital, where he had been confined for 2½ weeks. His physician, Capt. Robert E. Duncan, USH, said he died from a thrombosis of a cerebral artery.

The 79-year-old Californian died at 6:45 a. m., after having been in ill health for some time.

His political activities extended over a third of a century covering some of the most stirring events in the nations history.

A striking figure in the Senate since first elected to Congress in 1916, he played a leading part in defeating President Wilson's League of Nations Covenant and later in opposing United States' adherence to the World Court.

His wife, whom he referred to as "the boss," was with him at the time of his death.

Senator McKellar (D.-Tenn.), President of the Senate, today will appoint a committee to attend the funeral of the silver-haired veteran.

TERRITORIAL CHANGES OF WORLD WAR II—Black areas on map are those parts of Germany which the Big Three proposes will come under Polish rule. Shaded area is territory which Russia has taken control over since the start of hostilities on the continent. Northern East Prussia, proposed as Russian by the Big Three, is the newest addition to Soviet territory. There still remains some question as to final disposition of the port of Stettin. Note the large section of Baltic coastline of the proposed new Poland.

4 More Nippon Cities Now Smoldering Ruins

By The Associated Press

American airmen said they turned four more forewarned Japanese cities to ashes today as 750 Superforts and Mustang fighters reportedly swept the enemy's sacred islands with fire bombs, rockets and parachuted mines.

B-29 crewmen returning to their Marianas Island bases told of setting fires visible for 150 miles at sea. Some ran into intense antiaircraft fire and strong interception including rocket planes as they raided cities Tokyo described as "defenseless".

Waves of B-29s from the Marianas Islands and Mustang fighters from Iwo Jima struck as American commanders announced 70 Nipponese ships and small craft and 61 locomotives were destroyed or damaged in previous aerial blows, reaching over 4,500 miles from Paramushiro to Singapore.

Terror-ridden China carried the brunt of ground actions. Elsewhere land armies hunted for Japanese generals in the northern Philippines, drove toward trapping the largest Japanese force remaining in New Guinea and counted 13,000 Nipponese dead in recent fighting in monsoon-swept south Burma.

Superforts warned 12 more cities Sunday morning they were on their fire list. A formation of 580 followed up today by lighting towering fires in four of the 31 forewarned cities.

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Japanese also reported Mustangs from Iwo raked the capital with rockets, bombs and machinegun bullets in daylight for the third time in four days.

For consolation, Japanese propagandists reported: Americans "lead a starvation life;" Nipponese raiders caught U. S. planes lined up wing to wing on two Okinawa air fields; a U. S. submarine was sunk off the coast of Japan; Nipponese subs sank two Allied vessels in the central Pacific.

Chinese reports told of new terror in China. Once-beautiful Kweilin, former southeast China air base city, was left thoroughly sacked. Fifty-thousand Chinese were killed or missing from Kanhsien in east central China. A thousand civilians were reported killed by forced poisonous injections at Ichang, enemy-held central China river port.

Americans and Filipinos eliminated an ambushing Japanese company and beat back two desperate counterattacks on northern Luzon island, running last week's toll in the Philippines to 4,740 Japanese killed and 444 taken prisoner. U. S. losses for the week were 27 killed, 61 wounded.

Maj. Gen. William Gill offered a 45-day furlough to any member of the 32d Division who captures an enemy general alive. Chief prize is Gen. Tomoyuki Yamashita, onetime "Tiger of Malaya" variously reported cornered, killed or flown from northern Luzon mountains.

'Utter Destruction,' Promised in Potsdam Ultimatum, Unleashed; Power Equals 2,000 Superforts

WASHINGTON, Aug. 6 (AP)—The U. S. Army Air Force has released on the Japanese an atomic bomb containing more power than 20,000 tons of TNT.

It produces more than 2,000 times the blast of the largest bomb ever used before.

The announcement of the development was made in a statement by President Truman released by the White House today.

The bomb was dropped 16 hours ago on Hiroshima, an important Japanese army base.

The President said that the bomb has "added a new and revolutionary increase in destruction" on the Japanese.

Mr. Truman added:

"It is an atomic bomb. It is a harnessing of the basic power of the universe. The force from which the sun draws its power has been loosed against those who brought war to the Far East."

The base that was hit is a major quartermaster depot and has large ordnance, machine tool and aircraft plants.

The raid on Hiroshima, located on Honshu Island on the shores of the Inland sea, had not been disclosed previously although the 20th Air Force on Guam announced that 580 Superforts raided four Japanese cities at about the same time.

The city of 318,000 also contains a principal port.

2 Billion Gamble

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"We have spent $2,000,000,000 on the greatest scientific gamble in history—and won."

"We are now prepared to obliterate more rapidly and completely every productive enterprise the Japanese have above ground in any city. We shall completely destroy Japan's power to make war."

The President noted that the Big Three ultimatum issued July 26 at Potsdam was intended "to spare the Japanese people from utter destruction" and the Japanese leaders rejected it. The atomic bomb now is the answer to that rejection and the President said "they may expect a rain of ruin from the air, the like of which has never been seen on this earth."

Process Secret

Mr. Truman forecast that sea and land forces will follow up this air attack in such numbers and power as the Japanese never have witnessed.

The President said that this discovery may open the war for an entirely new concept of force and power. The actual harnessing of atomic energy may in the future supply the power that now comes from coal, oil and the great dams, he said.

"It has never been the habit of the scientists of this country or the policy of this government to withhold from the world scientific knowledge," Mr. Truman said. "Normally therefore everything about the work with atomic energy would be made public." That will have to wait, however, he said, until the war emergency is over.

MADE IN SANTA FE

WASHINGTON, Aug. 6 (AP)—The atomic bomb disclosed by President Truman today was developed at factories in Tennessee, Washington and New Mexico.

Mr. Truman said that from 65,000 to 125,000 workers were employed on the project at Oak Ridge near Knoxville, Tenn., at Richland near Pasco, Wash., and at an unnamed installation near Santa Fe, New Mexico.

He said the work was so secret that most of the employes did not know the character of it.

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The atomic bomb dwarfs by 2,000 times the blast power of the British "grand-slam" bomb, which weighed approximately 11 tons.

LONDON, Aug. 6 (AP)—Germany possessed some atomic power secrets, Winston Churchill said tonight, but "by God's mercy, British and American science outpaced all German efforts."

Tomato Juice Off Rationing

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May Be Tool To End Wars; New Era Seen

Mankind's successful transition to a new age, the Atomic Age, was ushered in July 16, 1945, before the eyes of a tense group of renowned scientists and military men gathered in the desertlands of New Mexico to witness the first hand results of their $2,000,000,000 effort. Here in a remote section of the Alamogordo Air Base 120 miles southeast of Albuquerque the first man-made atomic explosion, the outstanding achievement of nuclear science, was achieved at 5:30 a. m. of that day.

Mounted on a steel tower, a revolutionary weapon destined to change war as it has been known, or which may even be the instrumentality to end all wars, was set off with an impact which signalized man's entrance into a new physical world. Success was greater than the most ambitious estimates. A small amount of matter, the product of a chain of huge specially constructed industrial plants, was made to release the energy of the universe locked up within the atom from the beginning of time.

Credit J. R. Oppenheimer

This phase of the Atomic Bomb Project, which is headed by Maj. Gen. Leslie R. Groves, was under the direction of Dr. J. R. Oppenheimer, theoretical physicist of the University of California. He is to be credited with achieving the implementation of atomic energy for military purposes.

Tension before the actual detonation was at a tremendous pitch. Failure was an ever-present possibility. Too great a success, envisioned by some of those present, might have meant an uncontrollable, unusable weapon.

Final assembly of the atomic bomb began on the night of July 12 in an old ranch house. As various component assemblies arrived from distant points, tension among the scientists rose to an increasing pitch. Coolest of all was the man charged with the actual assembly of the vital core, Dr. R. F. Bacher, in normal times a professor at Cornell University.

Lightning Threatens

On Saturday, July 14, the unit which was to determine the success or failure of the entire project was elevated to the top of the steel tower.

The ominous weather which had dogged the assembly of the bomb had a very sobering effect on the assembled experts whose work was accomplished amid lightning flashes and peals of thunder.

Nearest observation point was set up 10,000 yards south of the tower where in a timber and earth shelter the controls for the tests were located. At a point 17,000 yards from the tower at a point which would give the best observation the key figures in the atomic bomb project took their posts. These included General Groves, Dr. Vannevar Bush, head of the Office of Scientific Research and Development, and Dr. James B. Conant, president of Harvard University.

Lie Face Down

Actual detonation was in charge of Dr. K. T. Bainbridge of Massachusetts Institute of Technology. He and Lieutenant Bush, in charge of the Military Police Detachment, were the last men to inspect the tower with its cosmic bomb.

At the Base Camp, all present were ordered to lie on the ground, face downward, heads away from the blast direction.

Tension reached a tremendous pitch in the control room as the deadline approached. The several observation points in the area were tied in to the control room by radio and with 20 minutes to go, Dr. S. K. Allison of Chicago University took

(Continued on Back Page)

The Weather

New Mexico: Partly cloudy with widely scattered thunderstorms mostly over mountains during afternoon and evening; otherwise fair tonight and tomorrow; no important change in temperature.

City

High 90, low 56.

Airport

Now They Can Be Told Aloud, Those Stoories of 'the Hill'

By WILLIAM McNULTY

The secret of Los Alamos is out and The New Mexican staff and other newspapermen through New Mexico can heave a sigh—sigh, nothing; it's more of a groan—of relief.

President Truman's revelation today that it was an atomic bomb THEY were working on on The Hill ended what was probably the strictest censorship ever imposed upon the press of this state. There was practically no limit to the lengths that the guards went to and the situation at times became fantastically involved including the famed "Battle of the MPs."

Notwithstanding the censorship, the news of Los Alamos had scarcely raced about the Plaza this morning when the membership of the "I-Knew-It-All-Along" club began growing by leaps and bounds. As a matter of record, the most recent rumor, No. 6,892—straight from the horses's mouth last week—was that Alamos was working lickety-split, night and day, in the production of windshield wipers for submarines.

The taboo on the mention of Los Alamos was final, complete and until today, irrevocable and not susceptible to any exceptions whatsoever.

A whole social world existed in nowhere in which people were married and babies were born nowhere. People died in a vacuum, autos and trucks crashed in a vacuum and the MPs baseball team materialized out of a vacuum, trained in a vacuum and after their games at Fort Marcy Park, returned to the vacuum. Even the graduates of Los Alamos Ranch School, the institution which preceded Uncle Sam's Atomic Bomb Project Laboratory, ceased to be graduates of Los Alamos; they bounded direct from Public School No. 7 clear into the classrooms of Harvard and Yale.

And on days when the Alamos experimenters threw their atomic bombs about a little too vigorously and the windows of Santa Fe rattled ominously, this paper's phones would ring but the whole staff could just "no speak English".

The chain of secrecy about the project was maintained from the big cities in East where workers were recruited clear through to the delivery of these same workers on The Hill. The Alamos Bus stop was at Sena Plaza and people laden with luggage and youngsters clinging to their arms, frequently barged into offices of that Plaza and inquired, "Where do we go to work?" One of the earliest bits of Alamos lore was that of the dude Wac who had never been farther west than Albany, N. Y.; she chose the moment when The Hill bus was turning the highest point on the Jemez mountains to peek out—and fainted dead away.

Under these conditions of secrecy rumors multiplied like maggots in one of Mel Hagman's garbage cans. Gas warfare, rockets, jet propulsion, death rays and — atomic bombs — were among the guesses most frequently voiced. During the last Presidential campaign, Alamos—no foolin'—was sometimes a Republican internment camp.

In the early days of the project, even the "outside employes" who knew no more of what was going on than the Japs in the foxholes of Guadalcanal, were sworn never to reveal what they didn't know anyway, for the rest of their lifetime. Our own B. B. Dunne got tangled in the wringer for so much as mentioning that "there were a lot of scientists in town".

Then there was the time when the New York Daily was whipping up a Sunday feature on Nobel prize-winners in the U. S. It queried The New Mexican for a brief summary of what Prof X was doing now. The staff recognized the Alamos postoffice box number—that famous postal box where babies were born and to which whole crateloads of furniture assigned—but it was decided to give the professor a whirl anyway on the old "You can't shoot me for trying" principle. A letter went out to Professor X in which an interview was asked.

The next morning at 8:09—their watches must have been slow,—two guards jumped the cityroom. After a heap of protestations and avowals of innocence, it was agreed that the following telegram could be sent the News:

"Your man working for Mr Whiskers on extremely hush-hush project. No soap."

The telegram was delivered in New York by a Western Union boy flanked by a covey of guards. These men then began spilling all over the News cityroom like oranges out of a busted crate.

How, they wanted to know, did the News staff explain such Dick Tracy huggermugger stuff?

The News' difficulty was that the girl who had sent the telegram had gone on vacation and couldn't be reached. The News explained it after two clouded weeks in which, by report, you couldn't toss a cigaret in a wastepaper basket without setting fire to a guard.

The tantalizing little that Santa Feans knew about The Hill, only heightened their interest. There were the lights to be seen from miles away; there were the days when fires raged and smoked billowed in the mountains and always the mysterious explosions. Lady Holmes moved to Tesuque and had moments when she thought she was back in bomb-shattered London!

The payoff, however, came in the "Battle of the MPs". More than a year ago a boxing card was arranged in which the Santa Fe High athletes took on the Alamos MPs. The sluggers from The Hill must have been missing out on their vitamins or the Demons were packing an atomic punch because the MPs were knocked cold, two or three of them in one round and one punch practically.

Unfortunately for Mel Rhine and his Santa Fe MPs—as distinct from the Alamos MPs—soldiers read the sports pages and the next Saturday night, there was an epidemic of free-swinging in the bars and restaurants.

Frantically Rhine demanded that The New Mexican print an explanation that the one-round pushovers were decidedly NOT his MPs but he ran smack into the Alamos secrecy ban.

For hours Rhine sweated over a document which, by the time it complied with censorship requirements, rambled for no less than 700 words or so—and meant exactly nothing to anybody. It was a masterpiece of obfuscation. Of course, the boys were still swinging at the so-called "one-round MPs" for weeks before they discovered their mistake.

ATOMIC BOMBS DRO

By WILL HARRISON

Last week's "Big I" handout from the Governor's office was today still reverberating in educational and legislative circles.

Governor Dempsey was quoted in the news handout as saying:

"During the 1943 Legislature I sponsored a bill which transferred all of the mineral leasing act funds, except that portion used for free textbooks and the Bureau of Mines, to the school equalization fund."

The act, in two years, has produced $1,165,173 for the school equalization fund.

Comes today a letter from Sen. J. H. Mullis of Roswell:

"Before the 1943 Legislature I conferred with J. D. Shinkle, superintendent of the Roswell schools, Col. E. L. Lusk of the New Mexico Military Institute, and Clarence E. Hinkle, president of the Roswell board of education, regarding legislation which would increase the teachers' salaries. We decided on three bills:

"1.—To transfer to the school fund, to be used to increase the teachers' salaries, the balance of the Mineral Leasing Act fund, mentioned by Governor Dempsey;

"2.—Reducing from 5 per cent to 3 per cent the amount allowed the Bureau of Revenue for collecting the sales tax;

"3.—Limiting the Commissioner of Public Lands to $100,000 per year.

"I had these bills prepared before the Legislature convened and Governor Dempsey had nothing to do with the preparation of these bills. It is my recollection that Governor Dempsey was opposed to the mineral funds bill because it took that amount from the general fund.

"I introduced the bills and with the help of the New Mexico Educational Association secured the passage of the first but the Governor had the other two killed."

As noted in this space Saturday, the teachers act which the Governor said "I sponsored" was permitted to pass only after the school lobby consented to support a Dempsey measure permitting the transfer of certain surplus administrative funds to the state general fund.

And after the "I sponsored bill" became law the administration even then tried to grab part of the mineral leasing money for other than school support. Nov. 20, 1943, state records show, Governor Dempsey's State Board of Finance ordered $85,612.16 of mineral leasing money transferred to the general fund. Educational groups put up a fight and on Nov. 29, 1943, the amount was returned on the authority of an Attorney General's opinion

Although the schools received during the past two years $1,165,173 as a result of the "I sponsored bill" a complete and truthful statement would show that funds almost equalling that amount were taken from the schools by Dempsey sponsored bills in the same Legislature that enacted the mineral leasing funds law.

The transfer law, for which Demp-

Deadliest Weapons in World's History Made In Santa Fe Vicinity

Santa Fe learned officially today of a city of 6,000 in its own front yard.

The reverberating announcement of the Los Alamos bomb, with 2,000 times the power of the great Grand-Slammers dropped on Germany, also lifted the secret of the community on the Pajarito Plateau, whose presence Santa Fe has ignored, except in whispers, for more than two years.

Decision to locate the Atomic Bomb Project Laboratory on mesa an hour's drive from Santa Fe, meant that it was necessary for the Army Engineers to construct an entirely new town to house the workers and their families. Primary reason for selection of the isolated site was security.

Ranch School Site

When the Army took over the property early in 1943 there were a few buildings which had been occupied by the Los Alamos Ranch School. New buildings began going up at once. Today there are 37 in the main technical area and about 200 others on the property used for the project itself. Three hundred buildings containing 620 family units, also were constructed, as well as military barracks, hospital buildings and structures for administrative offices.

Dr. J. R. Oppenheimer, one of the foremost physicists in the country and director of the laboratory, came to the site during early stages of construction. Other scientists and technical workers followed soon after.

Scientific groups which had been working on the project elsewhere in the country moved in rapidly, bringing their equipment with them. The Harvard cyclotron was in operation six weeks after it had reached the site.

Tortuous Route

Nearest railroad facilities are at Albuquerque and Santa Fe. This made it necessary to truck everything from those cities, at least. The road from Santa Fe is a tortuous one, and in the beginning, the last 18 miles were not paved. This was bad enough for passenger cars, and presented a particularly tough problem in hauling heavy loads.

Today the community has more than 6,000 residents. Slightly less than two-thirds are civilian men, women and children and the remainder military personnel. The post commandant is Col. Gerald R. Tyler.

REVOLUTIONARY

News of the development at Las Alamos of an atomic bomb immediately raised conjecture regarding the potential industrial uses of the energy.

The power of the atomic force harnessed by scientists in the secret projects is almost beyond comprehension—one bomb packing the wallop of the bomb loads of 2,000 Superforts. Talk was at once heard of the possibility of the newly controlled energy replacing coal, electricity, gasoline, water as a source of power.

That the study of the subject will continue was assured by the appointment by the Secretary of War of a committee to carry on investigation of atomic energy.

Spokesmen for the Las Alamos project said they had not been informed if this meant post-war continuation of the mountain project.

in mess halls, or in a large cafeteria, was housing. Various types were constructed, to meet different needs. There are three-room prefabricated, individual houses; three-room apartments, eight to a building, and four- and five-room apartments, four in a two-story unit. There are some hutments, Quonset-type huts and government and personally-owned trailers.

Bachelor Dorms

Dormitories have been constructed for unmarried personnel, or persons who do not have their families with them. Rents, for family groups, are based on earnings. Apartments are unfurnished and family groups ordinarily bring their furniture with them, although some items of government furniture have been available.

Housewives shop for food for daily meals at an army commissary where ration points are as important as elsewhere. A "trading post" offers items needed in everyday life and there are the usual post exchange stores.

Personnel living in dormitories eat There is also a dining room with waitress service.

City Dads, Too

A "town council" of eight elected members serves in an advisory capacity, meeting with representatives of the project and of the commanding officer. There is a school board, appointed by Colonel Tyler and Doctor Oppenheimer, which oversees operation of an accredited elementary school and high school. There

(Continued on Back Page)

Hi Johnson Dies at 79

WASHINGTON, Aug. 6 (AP)—Sen. Hiram W. Johnson of California, militant opponent of the League of Nations and the San Francisco Charter for a United Nations organization, died today.

The veteran Republican senator succumbed at Naval Hospital, where he had been confined for 2½ weeks. His physician, Capt. Robert E. Duncan, USH, said he died from a thrombosis of a cerebral artery.

The 79-year-old Californian died at 6:45 a. m., after having been in ill health for some time.

His political activities extended over a third of a century covering some of the most stirring events in the nations history.

A striking figure in the Senate since first elected to Congress in 1916, he played a leading part in defeating President Wilson's League of Nations Covenant and later in opposing United States' adherence to the World Court.

His wife, whom he referred to as "the boss," was with him at the time of his death.

Senator McKellar (D.-Tenn.), President of the Senate, today will appoint a committee to attend the

TERRITORIAL CHANGES OF WORLD WAR II—Black areas o map are those parts of Germany which the Big Three propose will come under Polish rule. Shaded area is territory which Russi has taken control over since the start of hostilities on the continen Northern East Prussia, proposed as Russian by the Big Three, is th newest addition to Soviet territory. There still remains some questio as to final disposition of the port of Stettin. Note the large sectio of Baltic coastline of the proposed new Poland.

4 More Nippon Cities Now Smoldering Ruins

By The Associated Press

American airmen said they turned four more forewarned Japa cities to ashes today as 750 Superforts and Mustang fighters reporte swept the enemy's sacred islands with fire bombs, rockets and parachu mines.

B-29 crewmen returning to their Marianas Island bases told of sett fires visible for 150 miles at sea. Some ran into intense antiaircraft and strong interception including rocket planes as they raided ci Tokyo described as "defenseless".

Waves of B-29s from the Marianas Islands and Mustang fighters from Iwo Jima struck as American commanders announced 70 Nipponese ships and small craft and 61 locomotives were destroyed or damaged in previous aerial blows, reaching over 4,500 miles from Paramushiro to Singapore.

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On Saturday, July 14, the un which was to determine the succes or failure of the entire project wa elevated to the top of the ste tower.

The ominous weather which ha dogged the assembly of the bom had a very sobering effect on th assembled experts whose work wa accomplished amid lightning flashe and peals of thunder.

Nearest observation point was se up 10,000 yards south of the towe where in a timber and earth shelte